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HEALTHCARE COST AND UTILIZATION PROJECT

HCUP Methods Series

Contact Information:
Healthcare Cost and Utilization Project (HCUP)
Agency for Healthcare Research and Quality
5600 Fishers Lane
Room 07W17B
Mail Stop 7W25B
Rockville, MD 20857
http://www.hcup-us.ahrq.gov

For Technical Assistance with HCUP Products:

Email: hcup@ahrq.gov

or

Phone: 1-866-290-HCUP

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1. EXECUTIVE SUMMARY

In October 2015 the United States transitioned to a modified version of the World Health Organization (WHO) International Classification of Diseases (ICD-10-CM/PCS), replacing the ICD-9-CM diagnosis and procedure coding system with the ICD-10-CM diagnosis coding system for most inpatient and outpatient medical encounters and the ICD-10-PCS procedure coding system for inpatient hospital procedures. This transition is expected to have a profound and direct impact on reimbursement and the delivery of medical care. However, health care researchers are expected to be affected by this transition when administrative databases become available with ICD-10-CM/PCS codes. This document is intended to summarize many of the main issues encountered by researchers when transitioning to the ICD-10-CM/PCS coding system, and summarizes tools and resources available to assist researchers with this transition.

Differences Between ICD-9-CM and ICD-10-CM/PCS Coding Systems

Researchers will have many more clinical codes to reference when using ICD-10-CM/PCS and additional clinical detail as a result. As of October 2015, there were 69,823 ICD-10-CM diagnosis codes, and 71,924 ICD-10-PCS procedure codes. Although the ICD-10-CM *diagnosis coding* system retains a similar hierarchical structure, there are substantial differences between the ICD-9-CM and the ICD-10-CM diagnosis coding systems. One of the major differences the inclusion of laterality (i.e., right/left) for body part, where appropriate.

The ICD-10-PCS *procedure coding* system is a complete structural revision to ICD-9-CM. Resulting is a seven-character code that can be interpreted by referencing the meaning of each character. Within sections of the coding system (e.g., Medical and Surgical procedure section) each position of the code (e.g., fifth digit) and each character within each position has a specific meaning, allowing for flexibility in expansion and consistency within the coding system.

Lessons From Dually Coded Data

Analysis of a dual-coded hospital discharge dataset (containing ICD-9-CM and ICD-10-CM/PCS codes for each discharge) revealed many consistencies across diagnosis and procedure codes when the data were grouped using AHRQ Clinical Classification Software (CCS) to CCS diagnosis and procedure categories. In specific cases, however, there were major shifts in coding, indicating that researchers should carefully examine coding ICD-9-CM and ICD-10-CM/PCS crosswalks prior to performing studies within their area of research to determine whether major changes are possible.

Tools to Define Cohorts and Clinical Conditions

The Centers for Medicare & Medicaid Services and the Centers for Disease Control and Prevention developed General Equivalence Mappings that form the basis of linkage between ICD-9-CM and ICD-10-CM/PCS codes in the United States.

There are many Web-based tools available for researchers; some tools translate individual codes, and other tools translate groups of codes. These tools also indicate whether codes map directly between the ICD-9-CM and ICD-10-CM/PCS systems, or there are potential issues with coding through convoluted (indirect or circular) crosswalk mappings.

Conditions, Procedures and Comorbidities in ICD-10-CM-PCS

Clinical grouping tools, such as the AHRQ CCS classifications and AHRQ Comorbidity measures software have been updated to use ICD-10-CM/PCS codes. These groupings can be useful for researchers to help bridge the ICD-9-CM to ICD-10-CM/PCS transition, by relying on classes or categories of codes to create a bridge between code sets, instead of relying on individual codes.

Longitudinal Analysis

Based on limited experiences from other countries, researchers should expect a variety of effects on longitudinal research studies. Effects will range from insubstantial changes in which direct code mappings from ICD-9-CM to ICD-10-CM/PCS are available and simple methods such as concordance tables and comparability ratios may be employed to bridge the transition. However, in some instances coding discontinuities could create substantial issues for longitudinal research studies.

ICD-10-CM/PCS Resources

Finally, many resources (books, online references, summaries, training tools, peer-reviewed manuscripts) are available to help researchers with this transition. A list of resources are provided in Section 9 of this report.

2. INTRODUCTION

On October 1, 2015, the United States transitioned to a modified version of the World Health Organization (WHO) International Classification of Diseases, thereby making one of the largest changes in recent health care history. This federally mandated change is required for all entities covered by the Health Insurance Portability and Accountability Act (HIPAA), essentially affecting the entire health care system.[1,2]

WHO created this system for classifying diseases to enhance international efforts for tracking communicable diseases (e.g., cholera, plague, yellow fever) and other global health problems (e.g., cardiovascular disease, tobacco consumption, traffic-related deaths). WHO granted authorization for creating modified systems to selected countries, such as Australia (ICD-10-AM), Canada (ICD-10-CA), Germany (ICD-10-GM), Thailand (ICD-10-TM), and the United States (ICD-10-CM).

In the United States, the change in coding systems involves replacing Volumes 1 and 2 of the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) codes with the International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM). Volume 3 of the ICD-9-CM has been replaced by the International Classification of Diseases, Tenth Revision, Procedure Coding System (ICD-10-PCS), a system that the Centers for Medicare & Medicaid Services (CMS) developed to cover inpatient procedures.[3] Transitioning to these new diagnostic and procedural codes will not affect two systems that are already in place: the Current Procedural Terminology (CPT®) coding for outpatient procedures and physician services and the ICD-10 coding of mortality, which was implemented in 1999.[3]

On the one hand, with ICD-10-CM/PCS the number of available diagnosis and procedure codes increases substantially. In addition, the ICD-10-CM diagnosis coding system provides greater specificity in codes, reduces the number of codes needed for the complete description of a condition (because it contains more detailed information, combination diagnosis codes, and symptom codes), and provides additional information relevant to describing managed care and ambulatory encounters.[4]

On the other hand, the ICD-10-PCS procedure coding system is a complete reconfiguration of the ICD-9-CM procedure coding system. ICD-10-PCS is a 7-digit, table-based alphanumeric system in which each character position describes a facet of the procedure, whereas the ICD-9-CM procedure coding system is arranged within a hierarchy.

Adopting the ICD-10-CM/PCS codes undoubtedly affects hospitals, health care facilities, and providers through changes in billing and reimbursement, although the extent of the impact within the United States is unknown and will continue to unfold. The transition to ICD-10-CM/PCS will have a substantial impact on research as well.[5] Conducting studies with ICD-10-CM/PCS data will require a learning curve as researchers become familiar with the new diagnostic and procedural codes.[5,6]

Researchers will face issues when they seek to draw conclusions from the results of studies that span the October 1, 2015, transition date (i.e., studies that include both ICD-9-CM and ICD-10-CM/PCS data). The transition is likely to be straightforward for cases in which individual codes map one-to-one from ICD-9-CM to ICD-10-CM/PCS or in which ICD-10-CM/PCS simply expands individual ICD-9-CM codes into an array of codes. However, challenges will arise

when a range of ICD-9-CM codes maps into varying ranges of ICD-10-CM/PCS codes or there are no corresponding ICD-10-CM/PCS codes.

The new ICD-10-CM/PCS system is thought to be a better reflection of current medical practices that will help improve the delivery of health care and billing as well as the evaluation of patient safety and outcomes.[6] Additional detail and the more logical organization of the ICD-10-CM/PCS coding system also should benefit researchers.[7] This report outlines both the value and the challenges of the new coding systems from the researcher's perspective.

The United States is a relative latecomer in adopting ICD-10-CM/PCS, with numerous other countries having transitioned to the new coding system more than a decade ago.[8] Studies conducted in countries that have implemented ICD-10-CM diagnosis codes can provide information about challenges that the United States might experience with this transition because the diagnosis code sets are relatively similar. However, for procedures, ICD-10-PCS is unique to the United States, and no international studies are available to provide guidance.

As an example, a Canadian study examined coding for diagnoses and comorbidities within hospital discharge data before and after the ICD-10-CA coding system was adopted.[9] Little variation in the number or type of common diagnoses or comorbidities was found, indicating that the transition did not result in substantial overall changes in hospital discharge data or coding practices. There were, however, small, province-specific differences in reporting practices.

Subsequent international (Canadian) studies comparing ICD-9-CM with modified versions of the ICD-10-CM in a variety of specific areas have found similar results. For example, results from the two coding systems were similar when they were used to measure the prevalence of nine comorbidities and three procedures associated with heart valve replacement surgery,[10] and high levels of agreement were found when they were used to identify stroke and its risk factors.[11] The two coding systems also performed equally well in predicting 30-day and 1-year mortality using acute myocardial infarction mortality prediction rules.[12] Additional studies verified the ability of ICD-10-CM comorbidity measures such as the Elixhauser measures and the Charlson index to predict the occurrence of medical conditions or death in patients with diabetes[13] or to predict in-hospital case fatality in patients who had a stroke.[14]

This report focuses on important issues in the ICD-10-CM/PCS transition for researchers. In addition to this introductory section, the report contains seven additional sections:

- Section 3 provides an overview of the basic differences between the ICD-9-CM and ICD-10-CM/PCS coding systems that researchers will need to understand when using administrative data that include these codes. This section addresses the new procedure coding system for inpatient procedures as well as the significant structural changes and coding guidelines for this new code set.

- Section 4 provides an overview of the results of our analysis of a dually coded ICD-9-CM/ICD-10-CM/PCS discharge dataset, including assignment error rates and lessons learned from a review of cases. Appendix C offers researchers detailed examples of the concepts addressed in Sections 3 and 4.

- Section 5 provides information about publicly available tools—such as software to map ICD-9-CM and ICD-10-CM/PCS codes—that can assist researchers in defining patient cohorts on the basis of conditions or procedures and comorbid conditions when analyzing datasets that contain ICD-9-CM and/or ICD-10-CM/PCS codes.

- Section 6 focuses on the impact that transitioning from ICD-9-CM to ICD-10-CM/PCS has on defining cohorts of patients who have clinical characteristics in common and on identifying risk-adjustment factors such as comorbid conditions.

- Section 7 discusses how transitioning from ICD-9-CM to ICD-10-CM/PCS will affect analyses of trends over time that include codes from both systems.

- Section 8 describes additional considerations of the transition related to claims payment leniency and ICD-11.

- Section 9 provides a list of resources with general information about coding system changes and the transition process as well as more in-depth information about the publically available tools listed in Section 5. It includes a bibliography of peer-reviewed articles and other literature that focuses on research using ICD-10-CM/PCS.

Throughout the document, shaded text boxes discuss important issues to consider when using the ICD-10-CM/PCS system.

3. DIFFERENCES BETWEEN ICD-9-CM AND ICD-10-CM/PCS CODING SYSTEMS

The ICD-10-CM/PCS code set includes a revision and enhancement of ICD-9-CM diagnosis codes and a complete overhaul of the procedure classification system. The newer code set contains many changes that bring the codes up to date, improve the classification organization, and provide greater specificity.

In this section we compare the diagnosis and procedure coding systems in a tabular format, followed by a review of two major concepts in ICD-10-PCS: root operation and approach.

Diagnosis Coding Systems

Figure 1 shows the structure of the two diagnosis coding systems in a graphical format.

Figure 1. ICD-9-CM and ICD-10-CM Diagnosis Coding Systems
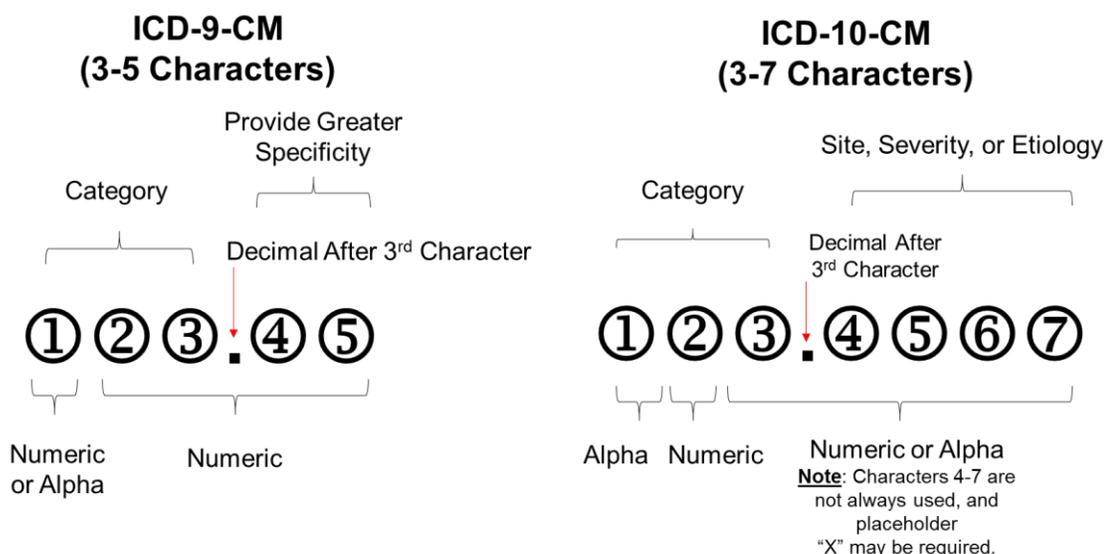
Table 1 describes the major differences between the two diagnosis code sets.

Table 1. Comparison of ICD-9-CM and ICD-10-CM Diagnosis Codes

Area of Interest	ICD-9-CM	ICD-10-CM
Uses	Used to report diagnoses in the inpatient and outpatient settings.	Same as ICD-9-CM
Structure	Hierarchical structure in which the first three characters represent the category of the code. Subsequent characters may be used to provide more specificity on the anatomic site, severity, or etiology of the condition. For example, category 250, Diabetes mellitus is further divided into subcategories (such as 250.4 Diabetes with renal manifestations) and then further divided into a code (such as 250.40, Diabetes with renal manifestations, type II, unspecified or not stated as uncontrolled). In contrast, category 075, Infectious mononucleosis, has no further specificity offered—075 is the only code in that category.	Similar to ICD-9-CM
	17 chapters with two supplementary classifications: (1) Factors Influencing Health Status and Contact With Health Services, (2) External Causes of Injury and Poisoning	21 chapters "Diseases of the Eye and Adnexa" and "Diseases of the Ear and Mastoid Process" were taken out of Diseases of the Nervous System and are now their own chapters (+2 chapters). "External Causes of Morbidity (E codes)" and "Factors Influencing Health Status and Contact with Health Services" were brought into the Main Classification and are Chapters 20 and 21, respectively (+2 chapters).
	Codes are alphanumeric, decimal after the third character	Same as ICD-9-CM
	Codes range from three to five characters.	Codes range are between three and seven characters long. The first three characters indicate category, and categories 4–6 indicate site, severity, and etiology. The seventh character is an extension that is used only in certain chapters.

Area of Interest	ICD-9-CM			ICD-10-CM		
	Character 1	**Characters 2–5**		**Character 1**	**Character 2**	**Characters 3–7**
	Numeric or Alpha	Numeric		Alpha	Numeric	Numeric or Alpha
Use of placeholders	Placeholder is not required.			Placeholder "X" is used to ensure that codes include the correct number of characters when applicable (e.g., M84.38XA, Stress fracture, other site, initial encounter for fracture).		
E Codes and V Codes	Supplemental Classifications for Factors Influencing Health Status and Contact with Heath Services (V-codes) and External Causes of Injury and Poisoning (E codes)			External Causes of Morbidity (Chapter 20) and Factors Influencing Health Status and Contact with Health Services (Chapter 21) are part of the main classification.		
	External Causes of Injury and Poisoning (E codes) are not required unless mandated by State-specific regulations or by specific payers (Workers' Compensation, Auto Insurers).			Same as ICD-9-CM		
Code definitions and titles	Contains abbreviated code titles that require the diagnosis code to reference the category or subcategory for a full description (e.g., 295.0 was labeled "Simple type" and the 3-digit code title "295 Schizophrenic disorders" is required to understand that 295.0 designates "Simple schizophrenia."			Full code titles at all code levels		
Laterality	Classification does not include laterality (i.e., left side/right side).			Laterality is incorporated into the chapters where applicable.		
Classification of complications of care	Postoperative complications are in the "Injury and Poisoning" chapter (Chapter 17).			Some postoperative complications are included in the specific body-system chapters.		
Specificity of injury coding	Injuries are classified by type (e.g., fracture, open wound).			Injuries are first classified by site (e.g., location on body), then by type.		
Combination coding	Multiple codes are required to report diagnoses with complications and/or manifestations. Example: Diabetes with complications and associated manifestations is reported with multiple ICD-9-CM codes.			Increased presence of combination codes that combine diagnoses with complications and/or manifestations into a single code. Example: Diabetes with complications and associated manifestations is reported with one ICD-10-CM code.		

Area of Interest	ICD-9-CM	ICD-10-CM
Number of codes (as of 10/01/2015)	14,025 codes	69,823 codes

There is a lack of consistency in the use of alpha characters in ICD-10-CM diagnosis codes.

- There is no consistency in the meaning of alpha characters for characters 3–6.

- Alpha characters appear in the middle of a numeric code set. For example, in Chapter 2, Neoplasms the categories are C43, **C4A**, C44, C45. Category C4A is in the middle of the range instead of appearing after C49 or before C40.

- There is more consistency in the 7th character, but not entirely. For example, in category S46, Injury of muscle, fascia and tendon at shoulder and upper arm level, the 7th character option "A" is initial encounter. But in the same chapter, category S82, Fracture of lower leg, including ankle, the 7th character option "A" is initial encounter for closed fracture.

Procedure Coding Systems

CMS developed the ICD-10-PCS procedure codes to replace Volume 3 of ICD-9-CM. Because the PCS is a new coding system and not a revision of the existing codes, it is important to understand the new structure and how the two code sets differ (see Figure 2).

Figure 2. ICD-9-CM and ICD-10-PCS Procedure Coding Systems

ICD-9-CM
(3-4 Characters)

ICD-10-PCS
(3-7 Characters)

Details of Code

Meaning Varies by Section

Category of Code

ICD-10-PCS Section
(e.g., Medical and Surgical)

Decimal After 2nd Character

① ② . ③ ④

① ② ③ ④ ⑤ ⑥ ⑦

Numeric

Alphanumeric

Placeholder "Z"
may be required
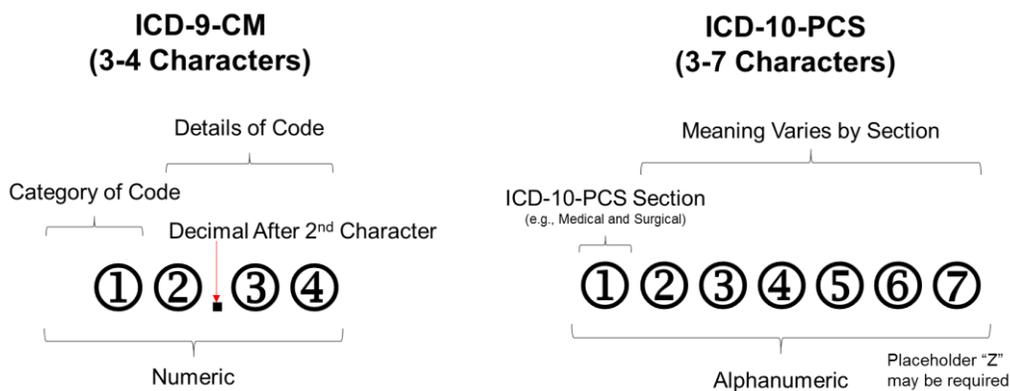
Table 2 describes the major differences between the two procedure code sets.

Table 2. Comparison of ICD-9-CM and ICD-10-PCS Procedure Codes

Area of Interest	ICD-9-CM	ICD-10-PCS
Uses	Used to report procedures in the inpatient setting. Does not apply to physician billing or the outpatient setting.	Same as ICD-9-CM
Structure	Hierarchical structure in which the first two characters are the category of the code (e.g., category 68 = other incision and excision of uterus) and the third and if applicable fourth characters specify the details of the code (e.g., 68.16 = Closed biopsy of uterus)	Tables are used to construct codes. Values are provided for each character of the code in a table format. Coders construct the code by translating medical documentation and selecting the appropriate value for each of the characters.
	15 chapters organized by body system plus 2 chapters with miscellaneous or "not elsewhere classified" procedures	Three main sections of codes: • Medical and Surgical • Medical and Surgical Related • Ancillary Each section has numerous subsections. • Medical and Surgical: 31 body systems • Medical and Surgical Related: 9 subsections • Ancillary: 7 subsections
	Codes are numeric.	Codes are alphanumeric.
	Codes are three to four characters long with a decimal after the second character.	Codes are seven characters long, no decimal is used, and character Z (None) is used when there are no values for a given character.
Code definitions and titles	Specific definitions are not provided within the classification.	Specific definitions for each position of the code are provided in the classification (e.g., Root Operation, defining the "objective" of the procedure, is designated in the third character of the Medical and Surgical section and Approach, defining the technique used to reach the site of the procedure, is designated in the fifth character of the Medical and Surgical Section). See Appendix A for a complete list of Root Operations and Table 6 for a list of Approaches
Code titles (descriptions)	Abbreviated code titles that require codes to reference the category or subcategory for a full description in the tabular section of the classification (similar to Diagnosis codes described above)	Full code titles are provided in the Code Listing section of the classification. PCS does not contain a tabular section like ICD-9-CM.
Number of codes (as of 10/01/2015)	3,824 codes	71,924 codes

ICD-10-PCS contains a multi-axial code structure that allows it to be complete and expandable.[15] Each character of the seven-character code has a specific meaning and represents details about the procedure. For example, in the Medical and Surgical section, the third character represents the Root Operation. An example for Root Operation is T, Resection.

> In ICD-10-PCS, each character has a different meaning.
>
> The character position meanings differ by section of ICD-10 (see Tables 3 and 4 of this report for code layout examples).

In the Imaging section (within the Ancillary section) the third character represents the Type of imaging. An example for Type is 3, Magnetic Resonance Imaging (MRI). Coders use tables that consist of all the character choices, known as *values,* to construct each procedure code. Table 3 illustrates the structure of a procedure code in the Medical and Surgical section of the PCS code set for various breast biopsies, as an example.

Table 3. Example. ICD-10-PCS Seven-Character Procedure Code Structure for Medical and Surgical Procedures, Breast Biopsy

Character 1	Character 2	Character 3	Character 4	Character 5	Character 6	Character 7
Section	Body System	Root Operation	Body Part	Approach	Device	Qualifier
0HBT0ZX, Excision of right breast, open approach, diagnostic						
0	H	B	T	0	Z	X
Medical and Surgical	Skin and Breast	Excision	Breast, right	Open	No Device	Diagnostic
0HBT3ZX, Excision of right breast, percutaneous approach, diagnostic						
0	H	B	T	3	Z	X
Medical and Surgical	Skin and Breast	Excision	Breast, right	Percutaneous	No Device	Diagnostic
0HBU3ZX, Excision of left breast, percutaneous approach, diagnostic						
0	H	B	U	3	Z	X
Medical and Surgical	Skin and Breast	Excision	Breast, left	Percutaneous	No Device	Diagnostic

The characters have different meanings in the different sections of the code book. Table 3 provides the meaning for each character in the Medical and Surgical section of the code set, but characters 1–7 have different meanings in the remaining sections of the code book, such as in the Obstetrics section or the Radiation Therapy section. Table 4 illustrates the structure of a code in the Radiation Therapy section of the code set for brachytherapy of the breast.

> The PCS procedure coding system uses a standardized terminology in which the characters and values included in this system are defined within the system and do not have multiple meanings. The standardized terminology is designed to reduce confusion and, in turn, to reduce inaccurate data.[16]

Table 4. Example. ICD-10-PCS Seven-Character Procedure Code Structure for Medical and Surgical Procedures, Radiation Therapy

Character 1	Character 2	Character 3	Character 4	Character 5	Character 6	Character 7
Section	Body System	Modality	Treatment Site	Modality Qualifier	Isotope	Qualifier
DM11B7Z, Low Dose Rate (LDR) Brachytherapy of Right Breast using Cesium 137 (Cs-137)						
D	M	1	1	B	7	Z
Radiation Therapy	Breast	Brachytherapy	Breast, right	Low Dose Rate (LDR)	Cesium 137 (Cs-137)	None
DM1198Z, High Dose Rate (HDR) Brachytherapy of Right Breast using Iridium 192 (Ir-192)						
D	M	1	1	9	8	Z
Radiation Therapy	Breast	Brachytherapy	Breast, right	High Dose Rate (HDR)	Iridium 192 (Ir-192)	None
DM1098Z, High Dose Rate (HDR) Brachytherapy of Left Breast using Iridium 192 (Ir-192)						
D	M	1	0	9	8	Z
Radiation Therapy	Breast	Brachytherapy	Breast, left	High Dose Rate (HDR)	Iridium 192 (Ir-192)	None

Researchers who use administrative data should become familiar with this new structure. For example, a comparison of open and closed breast biopsies would rely on the fifth character code representing the Approach (0 = open, 3 = percutaneous, and 4 = percutaneous endoscopic) (see Table 3).

Investigations of breast biopsies also would rely on the fourth character code representing the Body Part (T = Breast, right; U = Breast, left; V = Breast, Bilateral) (see Table 3). However, values can differ from section to section. In the Medical and Surgical section, body system Skin and Breast, the body part values for breast are T, U, and V (right, left, and bilateral, respectively). However, in the Radiation Therapy section, body system Breast, the fourth character treatment site values for breast are 0 and 1 (left and right, respectively). Therefore, when translating codes, one cannot say that a T in the fourth character position always represents the right breast.

Focus Areas in the Medical and Surgical Section: Root Operations and Approaches

Two focus areas to understand in the Medical and Surgical section are **Root Operations** (Character 3) and **Approaches** (Character 5). **Physician documentation of the Root Operation and the Approach is essential to correct coding of procedures.** Additionally, terminology differences between ICD-9-CM and ICD-10-PCS will make translating the PCS codes challenging during the transition to ICD-10-PCS. Therefore, root operation and approach are discussed in greater detail.

ICD-10-PCS Medical and Surgical Character 3: Root Operation

The root operation is the object of the procedure,[15] which is reported as the third character of the code in the Medical and Surgical section. There are 31 root operations for the Medical and Surgical section, and ICD-10-PCS provides a definition, explanation, and example for each root operation. Table 5 illustrates the three elements of the PCS root

operation. A complete list of the Medical and Surgical root operations can be found in Appendix A.

Table 5. ICD-10-PCS Root Operation Definition, Explanation, and Examples—Dilation

Dilation	**Definition:** Expanding an orifice or the lumen of a tubular body part
	Explanation: The orifice can be a natural orifice or an artificially created orifice. Accomplished by stretching a tubular body part using intraluminal pressure or by cutting part of the orifice or wall of the tubular body part.
	Examples: Percutaneous transluminal angioplasty

Source: Casto A. ICD-10-PCS Code Book. Chicago, IL: AHIMA Press; 2016. ISBN 9781584265245, p. 1320.

The PCS root operation terminology is not always the same as that used by physicians in operative reports and medical record documentation. For example, when the physician documents a percutaneous transluminal coronary angioplasty (PTCA) in the operative report, the coder will translate the procedure into root operation terminology and will report a code from ICD-10-PCS table "027, Dilation of heart and great vessels." In preparation for the transition, coders have received additional training in this area. The *2016 ICD-10-PCS Reference Manual* provided by CMS, presents detailed information about each **root** operation and provides examples and coding exercises for each.

The official code descriptions will include PCS standardized terminology, rather than conventional medical terminology.

For example, the official description for ICD-10-CM code 027044Z is "Dilation of coronary artery, one site with drug-eluting intraluminal device, percutaneous endoscopic approach" and does not include the terminology used in the medical record (i.e., PTCA).

Having a good working knowledge of the root operations and their meanings will ensure that researchers who use administrative data will select the correct codes when building cohorts.

Approach, Fifth Character of Medical and Surgical ICD-10-PCS Codes

The second critical aspect of standardized procedure terminology is the approach. **The approach is the technique that the physician uses to access the procedure site,[15] which is reported as the fifth character of the code.** For the approach, the coder translates the physician medical documentation and assigns the correct approach for the procedure(s) performed on the basis of the approach definitions included in PCS.

A definition is provided for each approach value. For example, the percutaneous endoscopic approach ("3") is defined as entry by puncture or minor incision, of instrumentation through the skin or mucous membrane and any other body layers necessary to reach and visualize the site of the procedure. Table 6 contains a complete list of the Medical and Surgical approaches.

Table 6. Complete List of Medical and Surgical Approaches, Fifth Character of ICD-10-PCS

	Medical and Surgical Approach Definitions (Character 5)		
	Approach	Definition	Example
X	External	Procedures performed directly on the skin or mucous membrane and procedures performed indirectly by the application of external force through the skin or mucous membrane	095KXZZ – Destruction of nose, external approach; Cautery of nosebleed
0	Open	Cutting through the skin or mucous membrane and any other body layers necessary to expose the site of the procedure	0HTT0ZZ – Resection of right breast, open approach; Right total mastectomy
3	Percutaneous	Entry, by puncture or minor incision, of instrumentation through the skin or mucous membrane and any other body layers necessary to reach the site of the procedure	02883ZZ – Division of conduction mechanism, percutaneous approach; Left heart catheterization with division of bundle of HIS
4	Percutaneous endoscopic	Entry, by puncture or minor incision, of instrumentation through the skin or mucous membrane and any other body layers necessary to reach and visualize the site of the procedure	04JJ4ZZ – Inspection of right shoulder joint, percutaneous endoscopic approach; Diagnostic arthroscopy of right shoulder
7	Via natural or artificial opening	Entry of instrumentation through a natural or artificial external opening to reach the site of the procedure	0T9B70Z – Drainage of bladder with drainage devise, via natural or artificial opening; Routine Foley catheter placement
8	Via natural or artificial opening endoscopic	Entry of instrumentation through a natural or artificial external opening to reach and visualize the site of the procedure	0DB68ZX – Excision of stomach, via natural or artificial opening endoscopic, diagnostic; EGD with gastric biopsy
F	Via natural or artificial opening with percutaneous endoscopic assistance	Entry of instrumentation through a natural or artificial external opening and entry, by puncture or minor incision, of instrumentation through the skin or mucous membrane and any other body layers necessary to aid in the performance of the procedure	0UT9FZZ – Resection of uterus, via natural or artificial opening with percutaneous endoscopic assistance; Laparoscopically assisted vaginal hysterectomy (LAVH)

Source: Centers for Medicare & Medicaid Services Files. 2016 PCS Code Tables & Index file.
https://www.cms.gov/Medicare/Coding/ICD10/2016-ICD-10-PCS-and-GEMs.html

ICD-10 Coding Rules

Several publications provide a detailed description of ICD-10-CM and ICD-10-PCS coding rules:

Schraffenberger LA. Basic ICD-10-CM/PCS Coding. Chicago, IL: AHIMA; 2012. ISBN 9781584265030.

Leon-Chisen N. ICD-10-CM and ICD-10-PCS Coding Handbook. Chicago, IL: American Hospital Association; 2016 Edition. ISBN 9781556484117.

Lovaasen KR, Schwerdtfeger BS. ICD-10-CM/PCS Coding: Theory and Practice; 2016 Edition. Abingdon, MD: Elsevier. ISBN 9780323389938.

4. LESSONS FROM DUALLY CODED DATA

In an effort to understand how ICD-10 will affect the coding of conditions and procedures, we undertook an analysis of a dataset provided by the Washington State Department of Health that contained diagnosis and procedure codes for 2,665 inpatient discharge records that were dually coded using both ICD-9-CM and ICD-10-CM/PCS. All records contained ICD-9-CM and ICD-10-CM diagnosis codes, and 1,456 records (55 percent) also contained procedure codes for both the ICD-9-CM and the ICD-10-PCS coding systems.

We used the Healthcare Cost and Utilization Project (HCUP) Clinical Classifications Software (CCS)[17,18] to examine the potential impact of transitioning from ICD-9-CM to ICD-10-CM/PCS and to analyze differences in coding across the two systems. The CCS is a diagnosis and procedure categorization scheme that collapses all ICD-9-CM and ICD-10 codes into a smaller number of clinically meaningful diagnosis and procedure groups. These CCS condition and procedure groups provide a means to identify cohorts for disease- or procedure-specific studies and for reporting statistical information about hospitalizations and health care resource utilization. The HCUP CCS for ICD-9-CM and HCUP CCS for ICD-10-CM/PCS tools were used to assign a CCS category to each of the diagnosis and procedure codes in the dataset.

Review of the dataset revealed some overarching themes related to the differences between coding systems. This section contains a summary of the dual-coded findings; Appendix C contains a detailed report of these findings.

Of note, most CCS assignments remained consistent in the two coding systems. Our analysis identified two major causes of differences: (1) differences in the two coding systems and (2) coding inconsistencies.

Differences in the ICD-9-CM and ICD-10-CM/PCS Coding Systems

Changes in Level of Specificity of Codes

Diagnosis codes. One of the main features of the ICD-10 coding system is increased specificity in diagnosis codes resulting in greater clinical detail.

Procedure codes. The expanded seven-character procedure code in ICD-10-PCS can include more information about location, approach, and device used than was available in ICD-9-CM.[16]

More ICD-10-CM/PCS Codes Than ICD-9-CM Codes May Be Required

Diagnosis codes. One way in which the level of clinical specificity is increased is that in some instances more ICD-10-CM/PCS codes are required for reporting conditions and procedures. This increase in codes could improve the level of clinical detail available to researchers.

Procedure codes. The guidelines for multiple procedures also have changed for ICD-10-PCS. The Official Coding Guidelines for the Medical and Surgical Section of ICD-10-PCS instruct coders to report multiple procedures during the same operative episode if certain conditions are met, such as the same procedure performed on different body parts.

Conversely, More Combination Codes in ICD-10-CM/PCS Resulting in Fewer Codes

Diagnosis codes. ICD-10 includes many new combination codes, which results in instances of fewer codes needed to capture the same information than was needed in ICD-9-CM (e.g., one code instead of two). For example, in ICD-10-CM, the use of combination codes for alcohol and drug use, abuse, and dependence has increased dramatically.

Procedure codes. Because of the increased number of characters in the ICD-10-PCS procedure coding system, a single seven-character code often can be used to report a procedure that required multiple codes in ICD-9-CM, Volume 3.

Less Specific Procedure Coding in ICD-10-PCS

When the two coding systems were compared, some ICD-10 codes were encountered that were less specific than the ICD-9-CM codes, resulting in a loss of information. Researchers should be aware of this and work to understand the differences behind the procedure codes of interest to their work.

> The differences described above may result in changes to CCS assignment or changes to the volume of CCS codes reported (e.g., fewer CCS codes reported as a result of fewer ICD-10 codes required).

Changes in Coding Rules

Rehabilitation Cases

It could be more difficult to identify rehabilitation cases. Guideline 1.B.15 in ICD-9-CM was removed in ICD-10-CM, and now rehabilitation V57 diagnosis codes under ICD-9-CM map to Z51.89, Encounter for other specified aftercare under ICD-10-CM. The condition or symptom for which admission is made will be listed as the principal/first listed code.

Tobacco Use Diagnosis Codes: Large Structural Changes

Researchers should use caution when coding and interpreting nicotine/tobacco codes. In ICD-9-CM tobacco use is reported with one code (Tobacco use disorder, 305.1). According to the ICD-9-CM Index, coders use this code for tobacco dependence and tobacco abuse.[19] In ICD-10-CM, more than 20 codes are available for tobacco use diagnoses (largely replacing *tobacco* with *nicotine*) with greater specificity. There also is a code in ICD-10-CM, Z72.0 for "Tobacco

use," which may create confusion because it is not intended to replace the single Tobacco use disorder code in ICD-9-CM. It is intended to be used sparingly and is not a definitive diagnosis.

Reclassification of Codes

Large Structural Changes in Procedure Coding: Diagnosis Not Included in ICD-10-PCS

One of the key features of ICD-10-PCS is that unlike several ICD-9-CM procedure code definitions, the procedure description does not contain diagnostic information.[15] With the ICD-9-CM system, a researcher may have relied on procedure codes containing diagnostic information to specify a patient cohort. This is no longer possible with ICD-10-CM.

For example, ICD-9-CM code 86.22, Excisional debridement of wound, infection, or burn indicates why the excision procedure took place (i.e., due to a wound, infection, or burn). In ICD-10-CM, the diagnostic information is no longer conveyed and similar excision codes can be found in PCS tables 0HB, Excision of Skin and Breast, and 0JB, Excision of subcutaneous tissue and fascia. Researchers may need to combine ICD-10-CM diagnosis code information with ICD-10-PCS procedure codes to identify patient cohorts. See Appendix B for specific examples and a detailed explanation.

Reclassification of Diagnoses and Procedures

During the update from ICD-9-CM to ICD-10-CM, some conditions were reclassified to a different category or a different chapter within the code set. For example, Sarciodosis was classified in Chapter 1 of the ICD-9-CM manual (Other Infectious and Parasitic Diseases) and is classified in Chapter 3 of the ICD-10-CM manual (Diseases of the Blood and Blood Forming Organs). This reclassification also could result in differences in CCS coding between the two systems.

Coding Inconsistencies Between ICD-9-CM and ICD-10-CM/PCS

Coding inconsistencies occur when a condition is reported in one coding system and a related but not identical condition is reported in the other coding system for the same encounter. Another type of coding inconsistency occurs when a condition is reported in one coding system—either ICD-9-CM or ICD-10-CM—but not the other for the same encounter.

Although these types of inconsistencies occurred infrequently, we could not identify which codes were accurate because we did not have access to the medical record documentation that would be needed to make such a determination. These inconsistencies could be due to changes in the ICD-10-CM system or could signal the need for further ICD-10-CM coding education or guideline clarification.

Coding inconsistencies between code systems and coders, such as dual coding ICD-9-CM and ICD-10-CM/PCS, should be expected, and these inconsistencies could affect CCS assignment and volume.

Examining the lessons learned from the dually coded dataset in this report provides an understanding of how differences in the new code sets affect administrative data and classification into broader groups such as CCS. When researchers select cohorts for studies

that include data from both coding systems, they will need to pay close attention to how ICD-9-CM codes may be modified in ICD-10-CM/PCS. Guidance and tools provided in subsequent sections should provide some assistance to researchers facing these decisions.

5. TOOLS TO DETERMINE CODE EQUIVALENCIES

Determining code equivalencies between the two systems can be aided with the use of crosswalks, which are designed to connect the codes in one system to codes in another system. General Equivalence Mappings (GEMs) provide a crosswalk between diagnosis and procedures codes in the ICD-9-CM and ICD-10-CM/PCS systems. The Centers for Medicare & Medicaid Services (CMS) and the Centers for Disease Control and Prevention (CDC) developed GEMs,[3] which form the basis of linkage between ICD-9-CM and ICD-10-CM/PCS codes in the United States.

The Lussier Research Group has developed tools to categorize each mapping pattern into increasing levels of complexity: identity, class-to-subclass, subclass-to-class, and convoluted, with a fifth category representing no mapping connection.[20] *Identity* means there is a one-to-one connection between an ICD-9-CM and ICD-10-CM/PCS code. *Class-to-subclass* means one code maps to a number of codes (one-to-many), *subclass-to-class* means that many codes map to a single code (many-to-one), *convoluted* means that there is no direct relationship between the two systems, and the final category contains codes with no mapping connection between the two coding systems.

In Boyd and colleagues's 2013 study of ICD-9-CM and ICD-10-CM linkages, the authors found that over one-third (36 percent) of the links between ICD-9-CM and ICD-10-CM diagnosis codes had a convoluted mapping pattern, the most complex type with interconnections with other mapping patterns.[20] The percentage of convoluted codes differed widely by clinical specialty— from 5 percent for hematology to 60 percent for obstetrics and injuries. Another study examining the connections between ICD-9-CM and ICD-10-CM diagnosis codes indicated that the largest percentage of convoluted codes were found in the area of external causes of morbidity, which classify environmental events and circumstances that cause injuries and other adverse effects.[21]

Linking the codes should be bidirectional. Forward mapping starts with the older ICD-9-CM codes and identifies their corresponding ICD-10-CM/PCS codes. Backward mapping starts with the newer ICD-10-CM/PCS codes and identifies their corresponding ICD-9-CM codes. Information can be lost regardless of which direction is used. It is recommended that when translating codes from one system to another, researchers use both directions to identify the full range of codes of interest because this approach should result in the most accurate translation.

According to a 2012 American Medical Association report, the resulting codes should be based on whichever coding system represents the most data within a given database.[22] In other words, ICD-10-CM/PCS codes initially would be mapped backward onto ICD-9-CM codes. Later, when datasets contain more ICD-10-CM/PCA codes, the direction would change, and ICD-9-CM codes would be mapped forward onto ICD-10-CM/PCS codes.

On the basis of Boyd and colleagues 2013 study,[20] which suggested that there would be fewer problems in translating diagnosis codes in hematology-oncology than in other specialties, a subsequent study involved an in-depth examination of the ICD-9-CM/ICD-10-CM crosswalk of codes related to cancer diagnoses.[23] Researchers identified cancer ICD-9-CM codes cited in three high-impact journals, attempting to map between ICD-9-CM and ICD-10-CM. They found that forward mapping should be supplemented with additional or manual review of ICD-10-CM codes, because additional, manual reviewing identified an additional 23 percent of clinically

relevant codes. They also demonstrated that backward mapping from ICD-10-CM to ICD-9-CM was particularly complex for these cancer codes. Given that other clinical specialties have even greater percentages of convoluted coding patterns, translating ICD-9-CM to ICD-10-CM/PCS codes could be even more complex.

Studies that include both coding systems are likely to be limited to the specificity of the least common denominator, which in virtually all cases will be the ICD-9-CM coding scheme. For example, a researcher using administrative data to analyze a cohort of patients who received a myomectomy (removal of uterine fibroids) will gain detailed information in the ICD-10-CM/PCS codes about the type of approach used—open, percutaneous, percutaneous endoscopic, via natural or artificial opening, or via natural or artificial opening endoscopic. However, in studies that span both coding systems, results will be restricted to the specificity of the sole ICD-9-CM code, which represents a myomectomy by any approach.

Understanding the complexities involved in connecting ICD-9-CM and ICD-10-CM/PCS codes, which are highlighted in the studies discussed above, also is important for interpreting the results of empirical studies based on administrative data and making the reader aware of methodological limitations.

Translation Tools for Linking/Connecting ICD-9-CM and ICD-10-CM/PCS Codes

Nosologists (medical coding professionals) familiar with both coding schemes have developed a variety of publicly available tools for use in health care research with ICD codes. Many proprietary tools also are available. Section 9 of this report, titled Resources for Researchers, provides additional information and educational materials about using the tools and about the transition from ICD-9-CM to ICD-10 codes. Unless indicated, all resources are available without charge.

Table 8 (presented later) provides information about translation tools that link ICD-9-CM and ICD-10-CM/PCS codes, along with Web site addresses where the tools can be used or downloaded. These applications provide a method for linking/connecting codes using bidirectional (forward and backward) mapping.

General Equivalence Mappings (GEMs)

The GEMs are reference mapping systems designed to perform forward and backward mappings between these two different ICD coding systems. The forward-mapping GEM includes all ICD-9-CM codes, and the backward-mapping GEM includes all ICD-10-CM/PCS codes.[3] CMS and CDC will update and maintain the GEMs on an annual basis at least through October 2018 and will post the GEMs on their respective Web sites as shown in Table 8.

The output for the GEMs provides five dichotomous flags that denote the relationship between the original codes and their corresponding codes:[3]

- Approximate (If yes, the corresponding code is not a precise representation of the original code. If no, there is a precise [exact] code match)
- No map (If yes, there is no corresponding code for the original code)

- Combination (If yes, there is more than one corresponding code for the original code)
- The fourth and fifth flags further clarify combination entries.

The GEMs files provide not only the mapping from one code set to another but all the attributes and mapping conventions that should be examined prior to determining the correct code on the basis of the user's needs. Therefore, researchers who want to investigate the details about mapping may want to choose this tool, although they are available as text files without an interface. Each user must interpret the attributes and mapping conventions to obtain a complete map, which can be difficult when combination and cluster coding (multiple code reporting) is required. Those who choose to use the GEMs should read the GEMs Documentation and Users Guide prior to mapping.

Other Web-Based Tools

Several tools, including MapIT and Lussier Research Group Mapping tools are based on the GEMs. The designers of these tools have used the attributes and mapping conventions provided in the GEMs, resulting in an interface that provides ICD mapping. These tools provide a method for those with limited coding knowledge to map codes from one code set to the other. Table 8 provides information about other Web-based tools, along with Web site addresses where the tools can be used or downloaded.

MapIT

The Agency for Healthcare Research and Quality (AHRQ) MapIT tool uses GEMs in a two-stage process to link ICD-9-CM and ICD-10-CM/PCS diagnosis, procedure, and external causes of morbidity codes.[24] MapIT provides forward and backward mapping as well as reverse translation (determining the original codes in either the forward or the backward mapping process). MapIT was designed to be a user friendly online tool that allows the user to import, export, compare, and search for ICD codes or groups of ICD codes.

Lussier Research Group Mapping Tools

The Lussier Research Group's three conversion tools (ICD-9-CM to ICD-10-CM, ICD-10-CM to ICD-9-CM, and Volume 3 ICD-9-CM to ICD-10-PCS) also use the GEMs to provide a three-step process for forward and backward mapping. Note that there is no backward map for ICD-10-PCS procedures. The results of all three tools provide information about the complexity of the linkage from one coding system to the other (see Table 7).

Table 7. Descriptions from the Lussier Conversion Tools

Label	Description
R	Identity or reciprocal, representing a direct, one-to-one link
C	Class to subclass, representing a one-to-many link
S	Subclass to class, representing a many-to-one link
H	Convoluted, representing a complex link that required interconnections with other mapping patterns; and
L	No link possible

Dr. Gily's Bidirectional Mapping Tool

This bidirectional tool based on GEMs permits users to perform single-code look-ups only. Users enter a code, designated as an ICD-9-CM or an ICD-10-CM/PCS code, and look up its linked code(s) in the other coding system. The response provided by this tool notes whether the linked code(s) are a direct or an approximate match or whether no match is available.

ICD10Data.com Mapping Tool

ICD10Data.com is another single-code bidirectional look-up tool in which users enter one code that is converted to its corresponding code(s)—from ICD-9-CM to ICD-10-CM/PCS or from ICD-10-CM to ICD-9-CM. This tool also provides information about whether the correspondence is direct or approximate or whether there is no corresponding code.

Table 8. Tools for Linking/Connecting ICD-9-CM and ICD-10-CM/PCS Codes

Tool	Source	Location (URL)	Resources (URL)
GEMs	CMS	https://www.cms.gov/Medicare/Coding/ICD10/index.html	1. GEMs: https://www.cms.gov/Medicare/Coding/ICD10/index.html[a] 2. American Medical Association Book: ICD-10-CM Mappings 2015: Linking ICD-9-CM to All Valid ICD-10-CM Alternatives (E-Book, available at a cost): https://commerce.ama-assn.org/store/catalog/productDetail.jsp?product_id=prod2570006&sku_id=sku2570005&navAction=push 3. GEMs frequently asked questions: https://www.cms.gov/medicare/coding/icd10/downloads/gems-crosswalksbasicfaq.pdf

Tool	Source	Location (URL)	Resources (URL)
MapIT	AHRQ	http://www.qualityindicators.ahrq.gov/resources/Toolkits.aspx	AHRQ MapIT Software User's Guide: http://www.qualityindicators.ahrq.gov/Downloads/Resources/AHRQ_MapIT_FY2015_User_Guide.pdf
Lussier Research Group Web pages	Lussier Research Group	http://www.lussierlab.org	ICD-9-CM To ICD-10-CM Conversion Tool: http://lussierlab.org/transition-to-ICD10CM ICD-10-CM To ICD-9-CM Conversion Tool: http://www.lussierlab.org/transition-to-ICD9CM/ Vol.3 ICD-9-CM To ICD-10-PCS Conversion Tool: http://lussierlab.org/transition-to-ICD10PCS
Dr. Gily's ICD 9 to 10 Bidirectional Crosswalk Tool	Individual physician	http://icd10cmcode.com/icd9to10conversion.php	http://icd10cmcode.com/icd9to10conversion.php[a]
ICD10 Data.com		http://www.icd10data.com/Convert	http://www.icd9data.com/ http://www.icd10data.com/

Abbreviations: AHRQ, Agency for Healthcare Research and Quality; CMS, Centers for Medicare & Medicaid Services; GEM, general equivalence mapping

[a] The resource also is the site for accessing the tool(s).

6. GROUPING CONDITIONS, PROCEDURES, AND COMORBIDITIES

Research applications of administrative data rely on the accurate identification of conditions, procedures, and events within clinical and coded data and therefore are dependent on the extent to which administrative data sources are complete, reliable, and valid.[25]

Assessing Sources of Information

Assessing the fitness of clinically coded data for reimbursement and research purposes such as quality measurement and risk adjustment has been an evolving practice since the late 1970s when the Institute of Medicine (IoM) published a series of studies on the reliability of hospital discharge abstracts.[26,27,28] Knowledge about the degree of accuracy of these data was critical, because discharge information was to be used as the basis of reimbursement of Medicare discharges within the new diagnosis-related group (DRG) system that would be implemented in 1982. The DRG payment system moved hospitals from a cost-based reimbursement system to paying hospitals on the basis of the clinical and anticipated procedural needs of patients; this change required the use of clinically coded data to distinguish comparable groups of patients. Other reimbursement systems, such as Hierarchical Condition Categories (HCCs), also rely on clinical coding to classify patients and to risk adjust plan payments within the Medicare Advantage program. Although it is beyond the scope of this report to discuss the significant impact of the ICD-10-CM/PCS transition on reimbursement, the role that clinical codes play in provider reimbursement is essential to understanding their role in research.

Following the IoM reports, comparing information from administrative data to information abstracted from medical records[26,27,29] also was important for the use of clinically coded data in a variety of research purposes including quality measurement and risk adjustment. Quality measurement involves the use of clinically coded categories to assess the structure, process, and outcomes of health care and patient health status. Quality measures are central to public reporting systems, such as the Agency for Healthcare Research and Quality National Health Disparities and Quality Report,[30] and to value-based payment systems. Risk adjustment involves the use of these categories to adjust measures by taking into account underlying patient factors that influence their health and their health care.

Several analytic methods have been developed to assess sources of information, such as the following methods listed by Liang et al.[31]

- Compare proportions of patients found with each condition, event, or procedure using each data source or coding system, and perform statistical tests

- Measure the agreement across coding systems in their ability to find a condition, event, or procedure, and comparing concordance by patient

- Designate one source as the gold standard (typically the medical record) and calculate sensitivity and specificity

The transition to ICD-10-CM/PCS, which has far more available codes than ICD-9-CM, presents an opportunity to revisit differences between administrative data and the medical record. Studies comparing information from medical records with administrative data involving ICD-10-CM/PCS codes would aid researchers in this important transition. In addition, because the

electronic medical record increasingly is becoming a storehouse for clinical content, comparing its information with that of claims data also will be of value.

Previous studies have shown that there are differences in the information obtained from medical records and claims, as can be expected from any two sources of data. For example, a recent study of women with breast cancer who were enrolled in a large health plan found that 94.9 percent had a gene expression profiling (GEP) test recorded in the medical record, whereas only 76.7 percent of them had ICD-9-CM codes in the administrative data indicating that the GEP test had been performed.[31]

Researchers who use datasets that contain both ICD-9-CM and ICD-10-CM/PCS codes also will need information about potential differences in clinical categories that are assigned when using the two different systems. One example of the challenge faced when creating a single patient cohort from both coding systems involves the acute phase of a myocardial infarction. This acute phase is defined as 8 weeks in the ICD-9-CM coding system but as 4 weeks in the ICD-10-CM/PCS system, which means that patients identified using the previous coding system will differ from those found using the current system. We discuss the types of issues that researchers need to address when using these tools in Section 7, titled Longitudinal Analysis. We also provide an example in Appendix C in which a dually coded dataset is analyzed to examine the impact on Clinical Classification Software (CCS) code groupings.

Grouping Tools for Converting ICD-10-CM/PCS Codes Into Categories

The remainder of this section discusses a variety of tools that are available for grouping patients using the new ICD-10-CM/PCS codes. Although the introduction of greater specificity in the ICD-10-CM/PCS coding system may allow for more precise selection of the cohort of interest, transition to the newer coding system will require some adjustment from researchers. Grouping diagnoses or procedures into categories may be one way to mitigate some of the differences between coding systems.

Table 9 lists selected publicly available grouping tools that classify the 69,823 diagnosis codes and 71,924 procedure codes in ICD-10-CM/PCS to create variables such as clinical classifications and chronic condition categories. The resultant categories are designed to be comparable to the same categories derived from ICD-9-CM codes.

Table 9. Grouping Tools for Finding Patient Cohorts and Other Variables Using ICD-9-CM and ICD-10-CM/PCS Codes

Tool	Source	Purpose	Location of Tool (URL)
Clinical Classifications Software	AHRQ	Define patient cohorts using diagnosis and procedure codes	https://www.hcup-us.ahrq.gov/toolssoftware/ccs10/ccs10.jsp
Procedure classes	AHRQ	Define patient cohorts on the basis of major/minor diagnostic/therapeutic procedures	https://www.hcup-us.ahrq.gov/toolssoftware/procedureicd10/procedure_icd10.jsp

Comorbidity measures software	AHRQ	Define comorbid conditions	https://www.hcup-us.ahrq.gov/toolssoftware/comorbidityicd10/comorbidity_icd10.jsp
Chronic Condition Indicator	AHRQ	Define chronic conditions	https://www.hcup-us.ahrq.gov/toolssoftware/chronic_icd10/chronic_icd10.jsp
ICD-10-CM/PCS MS-DRGs	CMS	Define patient cohorts and classify by severity of complications and comorbidities	http://www.ntis.gov/products/grouper/
Hierarchical condition categories	CMS	Define patient cohorts based on burden of illness	https://www.cms.gov/Medicare/Health-Plans/MedicareAdvtgSpecRateStats/Risk-Adjustors-Items/IDC10Mappings.html

Abbreviations: AHRQ, Agency for Healthcare Research and Quality; CMS, Centers for Medicare & Medicaid; MS-DRG, Medicare Severity Diagnosis Related Group; URL, Uniform Resource Locator

Clinical Classifications Software

CCS collapses ICD-10-CM/PCS codes within hospital discharge data into clinically meaningful categories that can be used to find patient cohorts on the basis of medical conditions (285 categories) or procedures performed (231 categories).[18] This tool can be used in a variety of studies, such as an examination of the most common conditions among hospital discharges.[32]

Comorbidity Measures

The Comorbidity Measures tool captures patient comorbidities using the ICD-10-CM diagnosis codes within hospital discharge data.[33,34] The tool distinguishes 30 comorbid conditions that have been identified as having an influence on outcomes such as mortality and length of stay. Researchers currently are creating two indices based on the Comorbidity Measures tool that are designed to predict in-hospital mortality and 30-day readmission rates when analyzing administrative data.[34]

Chronic Condition Indicator

The Chronic Condition Indicator (CCI) identifies diagnoses that represent chronic conditions (i.e., conditions that last at least 12 months and that either limit day-to-day activities or require ongoing intervention involving medical products, services, or equipment).[35] In addition to classifying all diagnoses into chronic or not chronic, the CCI groups diagnoses into body-system categories that identify the body systems that are affected.

Procedure Classes

Procedure Classes group procedure codes into minor versus major and diagnostic versus therapeutic categories.[36] The resultant four groups are as follows:

- Minor Diagnostic (nonoperating room procedures performed for diagnostic reasons)

- Minor Therapeutic (nonoperating room procedures performed for therapeutic reasons)
- Major Diagnostic (operating room procedures performed for diagnostic reasons)
- Major Therapeutic (operating room procedures performed for therapeutic reasons)

ICD-10 MS-DRG Conversion

The ICD-10 MS-DRG tool (which is publicly available at a cost), converts ICD-10-CM and ICD-10-PCS codes into Medicare Severity Diagnosis Related Group (MS-DRG) categories.[37] The MS-DRG codes can be grouped into 25 Major Diagnostic Category (MDC) groups representing the single organ systems most frequently associated with a given specialty.[37,38] There are approximately 450 MS-DRGs[39] that can be further grouped into three categories—major complication or comorbidity (the highest level of severity), complication or comorbidity, and no complication or comorbidity—reflecting the likelihood of requiring increased use of hospital resources.

Hierarchical Condition Categories

The risk adjustment hierarchical condition categories (HCCs) originally were implemented by the Health Care Financing Administration to predict health care expenditures.[40] These categories include two types of diagnosis groups, one representing data from inpatient admissions only and the other representing data from all physician and hospital encounters. The ICD-10-CM/PCS to HCC tool maps ICD-10-CM/PCS codes into 70 HCCs.[41,42] The most common use of HCCs is in risk-adjustment models to adjust payments on the basis of the relative health of the patient populations.[43]

Proprietary tools are available to help coders and researchers translate codes and classify patients, although we have limited our discussion to tools that are publicly available.

Also, to our knowledge, no tool provides a general translation of medical terms (such as condition names or clinically based procedure names, e.g., PCTA) to codes found in ICD-9-CM and ICD-10-CM/PCS. Future development of such a tool would be useful to the research community.

7. LONGITUDINAL ANALYSIS

The United States has required use of ICD-9-CM codes for Medicare and Medicaid billing since 1979. Since that time the ICD-9-CM code set has been subject to year-to-year changes in the number of codes available, in coding rules, and in the specificity of coding.[44] As a result, temporal coding-related discontinuities in trends, as well as those associated with changes in the practice of medicine, have occurred. However, implementation of the ICD-10-CM/PCS coding system presents the research community with a coding change of unprecedented magnitude—one of the areas of greatest concern is the impact that the ICD-10-CM/PCS transition will have on the analysis of longitudinal trends.

Although the implications of this conversion have not yet been determined, incorrect measurement of any variable or value can have a substantial effect on reporting and, most important, decisionmaking.[45] Therefore, researchers need to have thorough knowledge of the ICD-9-CM and the ICD-10-CM/PCS code sets and the reciprocal relationships between these codes before performing longitudinal analyses.

Section 4 of this report lists the tools that can help researchers link the two code sets and identify clinical characteristics. Section 5 discusses how the implementation of ICD-10 codes affects how researchers identify patient cohorts and group clinical characteristics. This section discusses how the ICD-10-CM/PCS implementation affects analyses using datasets that incorporate both ICD-9-CM and ICD-10-CM/PCS code sets.

The main question at hand for longitudinal research is—How much of the change in trend is associated with a change in **measurement** (i.e., coding) versus a change in the **underlying factors** associated with the trend? After a change in codes, coding rules, or code sets, it may be difficult to separate the impact of transitioning to ICD-10-CM/PCS from actual changes over time.

ICD-10 and Trend Analysis

As discussed in previous sections of this report, relationships between ICD-9-CM and ICD-10 are not always direct. It is important for the researcher to understand which types of relationships are occurring and their relevance to trend analysis. Boyd and colleagues[20,21] classify the different types of relationships between ICD-9-CM and ICD-10-CM/PCS codes (identity, convoluted, class-to-subclass, subclass-to-class, and no translation), which can be ascertained using reference and mapping tools. We discuss each type of relationship and its relevance to trend analysis.

- **Identity** (1:1 mapping): One-to-one relationships between ICD-9-CM and ICD-10-CM/PCS codes in which coding-related longitudinal discontinuities are less likely to appear.

- **Class-to-subclass and subclass-to-class** (1:m and m:1 mapping): One-to-many or many-to-one relationships between ICD-9-CM and ICD-10-CM/PCS codes in which use of the least common denominator (i.e., class) between code sets will bridge the transition until enough data are available in ICD-10-CM/PCS to establish trends.

- **Convoluted** (m:m mapping): Many-to-many mappings and discontinuities are more likely to occur in cases in which there is no clear mapping between code sets.

- **No translation** (1:none or none:1): Codes have no counterpart in the other code set (either ICD-9-CM or ICD-10-CM/PCS). When there is no ICD-9-CM counterpart for an ICD-10-CM/PCS code, the trend begins with ICD-10-CM/PCS, or, in rare cases when there is no ICD-10-CM/PCS counterpart, the trend ends with ICD-9-CM.

To analyze trends, researchers must account for a change in measurement (if the change in code sets is likely to affect measurement in the specific area of research) in order to discover the actual trends. Figure 1 illustrates the challenge. Is the increase that is seen between FY 2015 and 2016 due to the change in coding from ICD-9-CM to ICD-10-CM/PCS, an actual change in trend, or both? If both, how much of the trend can be attributed to the change in coding and how much to the actual change in trend?

Figure 3. Example of Longitudinal Change in Code Sets
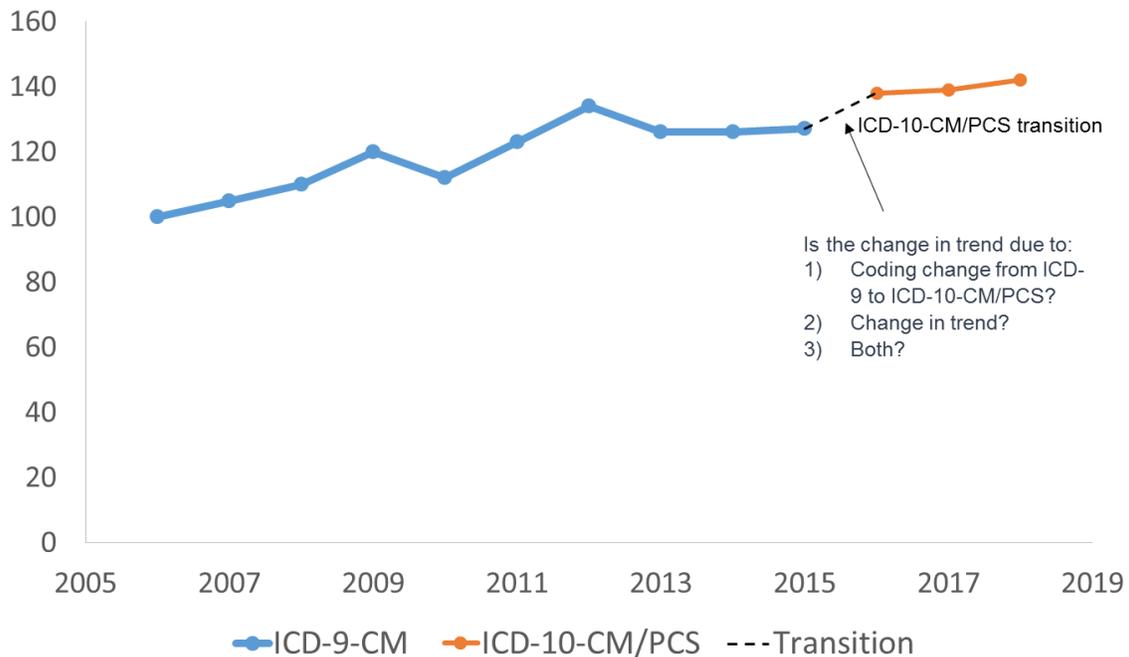
Strategies

Lessons for the ICD-9-CM to ICD-10-CM/PCS transition can be gleaned from previous ICD transitions. As an example, Janssen and colleagues examined longitudinal trends and discontinuities in cause-specific mortality rates in ICD data from six European countries covering five revisions (ICD-6-CM through ICD-10-CM/PCS).[44] The authors applied a combination of methods to determine the frequency of coding-related discontinuities in causes of death via visual inspection, concordance tables, and regression models. Significant ICD-version-related discontinuities were found in 4.6 percent of causes of death for ICD-9-CM to ICD-10-CM/PCS, which was lower than most previous revisions. ICD-related discontinuities for the ICD-6-CM/ICD-7-CM (evaluated together) to ICD-8-CM revision occurred in 16.0 percent of causes of death and in 10.8 percent of causes of death for the ICD-8-CM to ICD-9-CM revision.

Janssen et al. discussed strategies for longitudinal studies bridging the ICD-10-CM/PCS transition that include combining or grouping codes in different code systems across years.[44]

- **Classes**. Map all years of codes into broad, aggregated classes that represent the disease, procedure, or a combination of criteria. This approach is likely to reduce the impact of discontinuities, especially when coding within classes is relatively stable over time. However, certain codes or conditions cannot be studied using this approach because they change classes over time or when entire classes are lost because of the coding change.[46]

- **Bridge coding/concordance tables**. Create comparable code sets in each coding system over time.[47] This approach can accommodate customized (study-specific) code linkages.[48] Similarly, each coding system can be mapped at an aggregated level (e.g., 3-digit ICD-9-CM codes and their summarized equivalent in ICD-10-CM/PCS).[44]

The success of each of these approaches depends on the available codes in each system; discontinuities still may result.

Comparability Ratio

Another tool used in the implementation of ICD-10-CM/PCS cause of death coding was the use of comparability ratios (also called comparability factors).[48] A large volume of dually coded (or bridge coded) ICD-9-CM and ICD-10-CM/PCS data within a specified time period are needed to calculate comparability ratios. However, once calculated, comparability ratios provide a conversion factor across years that can help separate the magnitude of change in coding from the change in trend.

If researchers have access to a large, dually coded dataset, then comparability ratios may be a helpful tool to bridge the ICD-10-CM/PCS transition. One word of caution—the dually coded dataset used to calculate these ratios must be similar to the dataset to which comparability ratios will be applied; otherwise, the ratios are not likely to be relevant. Second, the condition of interest would need to be defined similarly in the comparability ratio and in the researcher's study. Third, the comparability ratios should not be used to extrapolate across many years, as year-to-year coding changes within each coding system also may affect the calculation of the comparability ratio.

To calculate the comparability ratio, the number of cases (e.g., number of deaths) or a measured rate (e.g., utilization rate) is calculated in both coding systems ($Rate_{ICD-10-CM/PCS}$ and $Rate_{ICD-9-CM}$) using the dually coded data. The following formula calculates the comparability ratio.

$$ComparabilityRatio_{9-TO-10} = Rate_{ICD-10-CM/PCS}/Rate_{ICD-9-CM}.$$

The comparability ratio then can be applied to measures calculated in one coding system as a conversion factor to calculate the rate in the other coding system. The following formula is an example of how to apply the comparability ratio to ICD-9-CM codes.

$$Rate_{ICD-10-CM/PCS} = Rate_{ICD-9-CM} * ComparabilityRatio_{9-TO-10}.$$

The formula above translates from ICD-9-CM to ICD-10-CM/PCS, but the reverse formula ($Rate_{ICD-9-CM}/Rate_{ICD-10-CM/PCS}$) can be used to calculate the comparability ratio ($ComparabilityRatio_{10-TO-9}$) translating ICD-10-CM/PCS to ICD-9-CM. Figure 4 illustrates how the

trend in the unadjusted ICD-10-CM/PCS rates, which exhibited a small but abrupt increase at the time of transition (orange line), disappeared once the ICD-10-CM/PCS rates were converted using this comparability ratio (black line).

The comparability ratio is interpreted as the percentage difference in the measure between the two coding systems.[49] For example, a comparability ratio of 1.33 from ICD-9-CM to ICD-10-CM/PCS can be interpreted as 33 percent more cases occurring in ICD-10-CM/PCS compared with ICD-9-CM as a result of the introduction of the new ICD-10-CM/PCS codes.[49] It should be noted that a comparability ratio of 1 does not indicate that the cases found or the rate calculated in each system is completely unaffected by the change in coding system; different cases could be added and subtracted to arrive at the same rate.[47] To our knowledge, no comparability studies have been performed using ICD-10-CM/PCS.

Figure 4. Example of Comparability Ratio Adjustment from ICD-10-CM/PCS to ICD-9-CM Codes in a Longitudinal Analysis
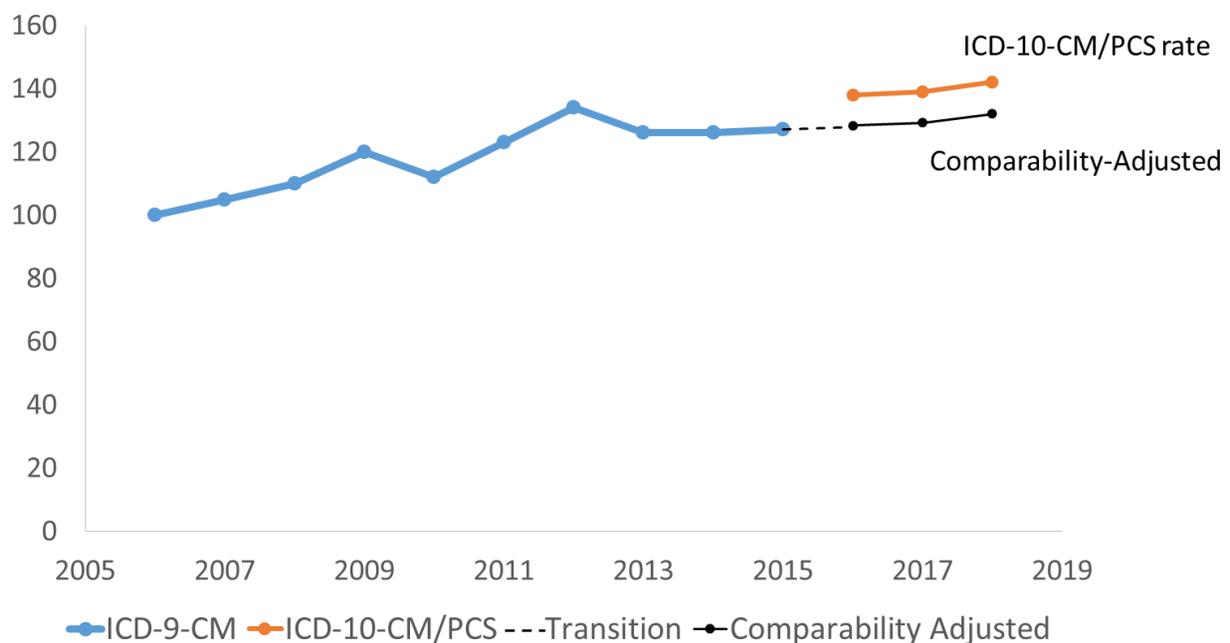
System

ICD-10-CM/PCS Cause of Death Transition

The United States implemented the World Health Organization ICD-10-CM/PCS for causes of death in 1999, coincident with the timing in many other countries. This transition provided examples of analyses and approaches for longitudinal analysis. Comparability ratios were used widely in this transition, and the Centers for Disease Control and Prevention National Center for Health Statistics created tables of comparability ratios (with standard error estimates) to aid researchers with longitudinal studies.[47,49]

Previous studies compared research results in both coding systems in (1) cross-sectional designs that used dually coded data or (2) longitudinal designs that used data before and after the ICD-10-CM/PCS transition. For example, Richardson found variability in consistency of

coding across cause-of-death categories when using dually coded U.S. ICD-9-CM/ICD-10-CM/PCS cause-of-death data to classify decedents.[50] Using ICD-10-CM/PCS as the standard, sensitivity (the proportion of decedents with the same cause of death in both the ICD-9-CM and ICD-10-CM/PCS data) ranged from 0.26 to 1.00, indicating range of false negative values in ICD-9-CM, and specificity (the proportion of decedents without a given cause of death category in both the ICD-9-CM and ICD-10-CM/PCS data) was above 0.98 for all categories, indicating few false positives in ICD-9-CM.

A study of trends in death rates from circulatory diseases in England and Wales demonstrated the differential impact of ICD-10-CM/PCS across causes.[51] Overall, the number of deaths attributed to circulatory diseases increased 3 to 4 percent as a result of the transition to ICD-10-CM/PCS. When analyzing trends in causes of death for specific circulatory diseases, no change in trends were attributed to ischemic heart disease. Changes in coding practices for acute myocardial infarction, a subset of conditions under ischemic heart disease, decreased 7 to 8 percent as a result of the transition to ICD-10-CM/PCS.

Jagai and colleagues tested whether trends in gastroenteritis-related mortality changed between ICD-9-CM (1985–1998) and ICD-10-CM/PCS (1999–2005).[52] Significant differences in the slope of the trend between the two coding systems were found for all gastroenteritis-related deaths (all-cause and specific causes), indicating a discontinuity in measurement between the two coding system.

Evidence From ICD-10 Diagnosis Codes (U.S. and International)

Several studies have examined the impact of the ICD-10 transition on diagnostic data in the United States as well as other countries. Fenton and colleagues created a dually coded ICD-9-CM and ICD-10-CM/PCS dataset for 2 months of hospital records in Wisconsin (July 2011 and July 2012) using translational software to ICD-10-CM/PCS, supplemented by naïve coding of medical records as needed. These findings illustrate a wide variation in comparability across conditions and across Joint Commission Core Measures. Comparability factors (i.e., comparability ratios multiplied by 100) were calculated for selected utilization rates as well as Joint Commission Core Measures.[45] A wide range of comparability ratios were reported for utilization rates, ranging from 0.1622 for Nicotine dependence, unspecified (fewer cases in ICD-10-CM/PCS relative to ICD-9-CM) to 1.1801 for Chronic obstructive pulmonary disease, unspecified (more cases in ICD-10-CM/PCS). The comparability ratios for the Joint Commission measures ranged from 0.2715 for Acute respiratory failure (fewer cases in ICD-10-CM/PCS) to 1.3016 for Acute myocardial infarction (more cases in ICD-10-CM/PCS).

Walker and colleagues studied the staggered implementation of the ICD-10-CA (the Canadian adaptation of ICD-10-CM/PCS) from 2001 through 2006 across nine provinces.[9] Using hospital discharge data, they found no major impact on coding practices as measured by the number of codes per discharge and the Charlson score. In particular, the number of diagnosis codes reported per discharge decreased slightly in four provinces but remained stable in the other five provinces. The distribution of the Charlson scores and the probability of at least one Charlson condition being reported on a discharge remained consistent with ICD-9-CM. The study did not include an analysis of the prevalence of specific conditions.

Southern and colleagues reported that the translation from ICD-9-CM to ICD-10-CM/PCS had little impact on an algorithm to merge information from administrative data to fill gaps (mainly the presence of comorbidities) in a clinical registry of individuals obtaining cardiac catheterization in Alberta, Canada.[53] The clinical information obtained from the ICD-10-CM/PCS administrative data was statistically similar to the information obtained from ICD-9-CM codes. Again, specific conditions were not analyzed.

Other Strategies

Researchers may attempt to account for the coding transition using dummy variables, adding a dummy variable for the transition year or for all years (or periods of time) that use a specific ICD version (e.g., ICD-9-CM or ICD-10-CM/PCS). Adding a dummy variable, in effect, creates a separate intercept for those years, which should be interpreted as all measured and unmeasured characteristics of those years, including the difference in coding system. Therefore it must be used with caution if other contemporaneous changes occur.

Although it is beyond the scope of this paper, previous coding changes have been addressed with other statistical econometric methodologies such as assessments of changes in coding[54] and adjustments for discontinuities.[55]

In conclusion, the impact of the coding change on longitudinal analysis will vary across conditions and procedures. Researchers should be aware that, in certain cases, it may not be possible to compare trends, levels, or rates before and after the change in code sets; in those instances, FY 2016 would serve as the index (starting) year.

8. OTHER CONSIDERATIONS

There are numerous topics for researchers to take into consideration when analyzing and interpreting diagnosis and procedure codes that are, by necessity, continually evolving to reflect changes in health care and to keep up with advances in technology.[56] In previous sections of this report, we discussed a variety of fundamental issues and potential solutions concerning the transition from ICD-9-CM to ICD-10-CM/PCS and how the most recent evolution could affect research that contains data from both coding systems. In this section, we discuss two additional topics that can influence current and future research.

Claims Payment Review Leniency Policy

In July 2015, the Centers for Medicare & Medicaid Services and the American Medical Association announced a claims payment review leniency policy that would be operative during the 12-month period after the October 1, 2015, implementation of the ICD-10-CM/PCS coding system.[57] This policy guarantees that no Medicare fee-for-service claims billed under the Part B physician fee schedule will be denied on the basis of the specificity of the ICD-10-CM/PCS diagnosis codes if the claim includes a valid ICD-10-CM/PCS code that falls within the correct three-character category.[58] This leniency policy applies only to specific Medicare fee-for-service claims; each commercial payer is allowed to decide whether it will adopt this policy.

Although the leniency policy was designed to avoid interruptions in the receipt of payments during the transition to the new coding system,[59] the implication of this policy on research involves the accuracy of ICD-10-CM/PCS codes for certain claims that fall between October 2015 and October 2016. The first three characters of the code, which represent clinically related conditions, must be valid. Therefore, researchers can be confident in the accuracy of the broader conditions (known as "family of codes") that these claims represent. However, some variation in the fourth through seventh characters could occur. Therefore, this policy might limit the level of specificity that can be reliably reported within this 1-year time frame.

ICD-11

The World Health Organization (WHO), which created the ICD codes as a standardized method for analyzing health and health care around the globe, is planning to distribute its 11th revision (ICD-11) in 2018.[60] One goal of this future version is to improve the coding system. WHO began field-testing ICD-11 in May of 2012.[61] To our knowledge there is no known target date for U.S. implementation of ICD-11.

ICD-11 is designed to improve comparability across modified versions of the ICD-10-CM/PCS coding system collected in various countries.[61] To address this issue, the ICD-11 version has a *framework component,* a common core used by all revisions that can be tailored to fit users' needs by adding detail within *linearizations* (i.e., ICD-11 organization structure similar to the tabular lists in ICD-10-CM/PCS).

An important development is harmonization of ICD-11 codes and the structure of the Systematized Nomenclature of Medicine–Clinical Terms (SNOMED CT), a comprehensive collection of medical terminology in electronic medical record systems.[62,63]

Because any changes in such a complex coding system are bound to affect the ability to track disease and mortality across time, WHO is taking steps to lessen the impact of these revisions. A complex system has been created to track and document changes such as categories that have been added, deleted, or moved to a different position in the category "tree."[64]

9. RESOURCES FOR RESEARCHERS

This section contains a list of helpful resource for researchers. The list is organized by type of ICD-10-CM/PCS resource. Topics include:

- Conference Proceedings and Online Webinars
- Healthcare Cost and Utilization Project (HCUP) Software Tools
- ICD-10 Textbooks/Workbooks
- ICD-10 Codebooks
- ICD-10 Software and Tools
- Peer Reviewed Journal Articles
- Online Non-Journal Articles, Reports and Other Publications (from Non-Government Agencies)
- User Guides or Technical Reports from Government Agencies
- Working Papers
- Books

Conference Proceedings and Online Webinars

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Healthcare Cost and Utilization Project (HCUP) Software Tools

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Healthcare Cost and Utilization Project. Procedure Classes for ICD-10-PCS. Rockville, MD: Agency for Healthcare Research and Quality; October 2015. https://www.hcup-us.ahrq.gov/toolssoftware/procedureicd10/procedure_icd10.jsp.

ICD-10 Textbooks/Workbooks

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Lovaasen KR, Schwerdtfeger BS. ICD-10-CM/PCS Coding: Theory and Practice, 2016 Edition. Abingdon, MD: Elsevier. ISBN 9780323389938.

Schraffenberger LA. Basic ICD-10-CM/PCS Coding. Chicago, IL: AHIMA Press. ISBN 9781584265030.

ICD-10 Codebooks

Casto A. ICD-9-CM Code Book, Volumes 1, 2, and 3. Chicago, IL: AHIMA Press. ISBN 9781584264385.

Casto A. ICD-10-CM Code Book. Chicago, IL: AHIMA Press. ISBN 9781584265238.

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ICD-10 Software and Tools

Advancing the Business of Healthcare (AAPC). ICD-10 Code Translator. https://www.aapc.com/icd-10/codes/.

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APPENDIX A. MEDICAL AND SURGICAL PROCEDURE CODING: ROOT OPERATIONS AND APPROACHES

The seven characters of the ICD-10-PCS codes in the Medical and Surgical Procedures section are described in Table A1. Of specific importance are the third and fifth characters representing the root operation, or objective, of the procedure in the third character, and the approach, or method used to reach the procedure site in the fifth character. This Appendix includes a complete listing of values for root operation (Table A2) and approach (Table A3).

Table A1. ICD-10-PCS Seven-Character Procedure Code Structure for Medical and Surgical Procedures

Character 1	Character 2	Character 3	Character 4	Character 5	Character 6	Character 7
Section	Body System	Root Operation	Body Part	Approach	Device	Qualifier

Complete List of Root Operations

Table A2. Complete List of Root Operations, Third Character of ICD-10-PCS

Medical and Surgical Root Operations (Character 3)	
Alteration (0)	**Definition:** Modifying the anatomic structure of a body part without affecting the function of the body part
	Explanation: Principal purpose is to improve appearance
	Includes/Examples: Face lift, breast augmentation
Bypass (1)	**Definition:** Altering the route of passage of the contents of a tubular body part
	Explanation: Rerouting contents of a body part to a downstream area of the normal route, to a similar route and body part or to an abnormal route and dissimilar body part. Includes one or more anastomoses, with or without the use of a device
	Includes/Examples: Coronary artery bypass, colostomy formation
Change (2)	**Definition:** Taking out or off a device from a body part and putting back an identical or similar device in or on the same body part without cutting or puncturing the skin or a mucous membrane
	Explanation: All CHANGE procedures are coded using the approach EXTERNAL
	Includes/Examples: Urinary catheter change, gastrostomy tube change
Control (3)	**Definition:** Stopping, or attempting to stop, postprocedural bleeding
	Explanation: The site of the bleeding is coded as an anatomical region and not to a specific body part
	Includes/Examples: Control of postprostatectomy hemorrhage, control of posttonsillectomy hemorrhage

Medical and Surgical Root Operations (Character 3)	
Creation (4)	**Definition:** Making a new genital structure that does not take over the function of a body part
	Explanation: Used only for sex change operations
	Includes/Examples: Creation of vagina in a male, creation of penis in a female
Destruction (5)	**Definition:** Physical eradication of all or a portion of a body part by the direct use of energy, force, or a destructive agent
	Explanation: None of the body part is physically taken out
	Includes/Examples: Fulguration of rectal polyp, cautery of skin lesion
Detachment (6)	**Definition:** Cutting off all or a portion of the upper or lower extremities
	Explanation: The body part value is the site of the detachment, with a qualifier if applicable to further specify the level where the extremity was detached
	Includes/Examples: Below knee amputation, disarticulation of shoulder
Dilation (7)	**Definition:** Expanding an orifice or the lumen of a tubular body part
	Explanation: The orifice can be a natural orifice or an artificially created orifice. Accomplished by stretching a tubular body part using intraluminal pressure or by cutting part of the orifice or wall of the tubular body part
	Includes/Examples: Percutaneous transluminal angioplasty, pyloromyotomy
Division (8)	**Definition:** Cutting into a body part, without draining fluids and/or gases from the body part, in order to separate or transect a body part
	Explanation: All or a portion of the body part is separated into two or more portions
	Includes/Examples: Spinal cordotomy, osteotomy
Drainage (9)	**Definition:** Taking or letting out fluids and/or gases from a body part
	Explanation: The qualifier DIAGNOSTIC is used to identify drainage procedures that are biopsies
	Includes/Examples: Thoracentesis, incision and drainage
Excision (B)	**Definition:** Cutting out or off, without replacement, a portion of a body part
	Explanation: The qualifier DIAGNOSTIC is used to identify excision procedures that are biopsies
	Includes/Examples: Partial nephrectomy, liver biopsy
Extirpation (C)	**Definition:** Taking or cutting out solid matter from a body part

Medical and Surgical Root Operations (Character 3)		
	Explanation: The solid matter may be an abnormal byproduct of a biological function or a foreign body; it may be imbedded in a body part or in the lumen of a tubular body part. The solid matter may or may not have been previously broken into pieces	
	Includes/Examples: Thrombectomy, choledocholithotomy	
Extraction (D)	**Definition:** Pulling or stripping out or off all or a portion of a body part by the use of force	
	Explanation: The qualifier DIAGNOSTIC is used to identify extraction procedures that are biopsies	
	Includes/Examples: Dilation and curettage, vein stripping	
Fragmentation (F)	**Definition:** Breaking solid matter in a body part into pieces	
	Explanation: Physical force (e.g., manual, ultrasonic) applied directly or indirectly is used to break the solid matter into pieces. The solid matter may be an abnormal byproduct of a biological function or a foreign body. The pieces of solid matter are not taken out	
	Includes/Examples: Extracorporeal shockwave lithotripsy, transurethral lithotripsy	
Fusion (G)	**Definition:** Joining together portions of an articular body part rendering the articular body part immobile	
	Explanation: The body part is joined together by fixation device, bone graft, or other means	
	Includes/Examples: Spinal fusion, ankle arthrodesis	
Insertion (H)	**Definition:** Putting in a nonbiological appliance that monitors, assists, performs, or prevents a physiological function but does not physically take the place of a body part	
	Includes/Examples: Insertion of radioactive implant, insertion of central venous catheter	
Inspection (J)	**Definition:** Visually and/or manually exploring a body part	
	Explanation: Visual exploration may be performed with or without optical instrumentation. Manual exploration may be performed directly or through intervening body layers	
	Includes/Examples: Diagnostic arthroscopy, exploratory laparotomy	
Map (K)	**Definition:** Locating the route of passage of electrical impulses and/or locating functional areas in a body part	
	Explanation: Applicable only to the cardiac conduction mechanism and the central nervous system	
	Includes/Examples: Cardiac mapping, cortical mapping	
Occlusion (L)	**Definition:** Completely closing an orifice or the lumen of a tubular body part	

Medical and Surgical Root Operations (Character 3)	
	Explanation: The orifice can be a natural orifice or an artificially created orifice
	Includes/Examples: Fallopian tube ligation, ligation of inferior vena cava
Reattachment (M)	**Definition:** Putting back in or on all or a portion of a separated body part to its normal location or other suitable location
	Explanation: Vascular circulation and nervous pathways may or may not be reestablished
	Includes/Examples: Reattachment of hand, reattachment of avulsed kidney
Release (N)	**Definition:** Freeing a body part from an abnormal physical constraint by cutting or by the use of force
	Explanation: Some of the restraining tissue may be taken out but none of the body part is taken out
	Includes/Examples: Adhesiolysis, carpal tunnel release
Removal (P)	**Definition:** Taking out or off a device from a body part
	Explanation: If a device is taken out and a similar device put in without cutting or puncturing the skin or mucous membrane, the procedure is coded to the root operation CHANGE. Otherwise, the procedure for taking out a device is coded to the root operation REMOVAL
	Includes/Examples: Drainage tube removal, cardiac pacemaker removal
Repair (Q)	**Definition:** Restoring, to the extent possible, a body part to its normal anatomic structure and function
	Explanation: Used only when the method to accomplish the repair is not one of the other root operations
	Includes/Examples: Colostomy takedown, suture of laceration
Replacement (R)	**Definition:** Putting in or on biological or synthetic material that physically takes the place and/or function of all or a portion of a body part
	Explanation: The body part may have been taken out or replaced, or may be taken out, physically eradicated, or rendered nonfunctional during the Replacement procedure. A Removal procedure is coded for taking out the device used in a previous replacement procedure
	Includes/Examples: Total hip replacement, bone graft, free skin graft
Reposition (S)	**Definition:** Moving to its normal location, or other suitable location, all or a portion of a body part
	Explanation: The body part is moved to a new location from an abnormal location, or from a normal location where it is not functioning correctly. The body part may or may not be cut out or off to be moved to the new location

Medical and Surgical Root Operations (Character 3)	
	Includes/Examples: Reposition of undescended testicle, fracture reduction
Resection (T)	**Definition:** Cutting out or off, without replacement, all of a body part
	Includes/Examples: Total nephrectomy, total lobectomy of lung
Restriction (V)	**Definition:** Partially closing an orifice or the lumen of a tubular body part
	Explanation: The orifice can be a natural orifice or an artificially created orifice
	Includes/Examples: Esophagogastric fundoplication, cervical cerclage
Revision (W)	**Definition:** Correcting, to the extent possible, a portion of a malfunctioning device or the position of a displaced device
	Explanation: Revision can include correcting a malfunctioning or displaced device by taking out or putting in components of the device such as a screw or pin
	Includes/Examples: Adjustment of position of pacemaker lead, recementing of hip prosthesis
Supplement (U)	**Definition:** Putting in or on biological or synthetic material that physically reinforces and/or augments the function of a portion of a body part
	Explanation: The biological material is nonliving, or is living and from the same individual. The body part may have been previously replaced, and the Supplement procedure is performed to physically reinforce and/or augment the function of the replaced body part.
	Includes/Examples: Herniorrhaphy using mesh, free nerve graft, mitral valve ring annuloplasty, put a new acetabular liner in a previous hip replacement
Transfer (X)	**Definition:** Moving, without taking out, all or a portion of a body part to another location to take over the function of all or a portion of a body part
	Explanation: The body part transferred remains connected to its vascular and nervous supply
	Includes/Examples: Tendon transfer, skin pedicle flap transfer
Transplantation (Y)	**Definition:** Putting in or on all or a portion of a living body part taken from another individual or animal to physically take the place and/or function of all or a portion of a similar body part
	Explanation: The native body part may or may not be taken out, and the transplanted body part may take over all or a portion of its function
	Includes/Examples: Kidney transplant, heart transplant

Source: Centers for Medicare & Medicaid Services Files
(https://www.cms.gov/Medicare/Coding/ICD10/2016-ICD-10-PCS-and-GEMs.html) 2016 PCS Code Tables & Index file.

Complete List of Medical and Surgical Approaches

Table A3. Complete List of Medical and Surgical Approaches, Fifth Character of ICD-10-PCS

Medical and Surgical Approach Definitions (Character 5)			
	Approach	**Definition**	**Example**
X	External	Procedures performed directly on the skin or mucous membrane and procedures performed indirectly by the application of external force through the skin or mucous membrane	095KXZZ – Destruction of nose, external approach; Cautery of nosebleed
0	Open	Cutting through the skin or mucous membrane and any other body layers necessary to expose the site of the procedure	0HTT0ZZ – Resection of right breast, open approach; Right total mastectomy
3	Percutaneous	Entry, by puncture or minor incision, of instrumentation through the skin or mucous membrane and any other body layers necessary to reach the site of the procedure	02883ZZ – Division of conduction mechanism, percutaneous approach; Left heart catheterization with division of bundle of HIS
4	Percutaneous Endoscopic	Entry, by puncture or minor incision, of instrumentation through the skin or mucous membrane and any other body layers necessary to reach and visualize the site of the procedure	04JJ4ZZ – Inspection of right shoulder joint, percutaneous endoscopic approach; Diagnostic arthroscopy of right shoulder
7	Via Natural or Artificial Opening	Entry of instrumentation through a natural or artificial external opening to reach the site of the procedure	0T9B70Z – Drainage of bladder with drainage devise, via natural or artificial opening; Routine Foley catheter placement
8	Via Natural or Artificial Opening Endoscopic	Entry of instrumentation through a natural or artificial external opening to reach and visualize the site of the procedure	0DB68ZX – Excision of stomach, via natural or artificial opening endoscopic, diagnostic; EGD with gastric biopsy
F	Via Natural or Artificial Opening with Percutaneous Endoscopic Assistance	Entry of instrumentation through a natural or artificial external opening and entry, by puncture or minor incision, of instrumentation through the skin or mucous membrane and any other body layers necessary to aid in the performance of the procedure	0UT9FZZ – Resection of uterus, via natural or artificial opening with percutaneous endoscopic assistance; Laparoscopically assisted vaginal hysterectomy (LAVH)

Source: Centers for Medicare & Medicaid Services Files (https://www.cms.gov/Medicare/Coding/ICD10/2016-ICD-10-PCS-and-GEMs.html) 2016 PCS Code Tables & Index file.

Several publications provide a detailed description of ICD-10-CM and ICD-10-PCS coding rules:

Schraffenberger LA. Basic ICD-10-CM/PCS Coding. Chicago, IL: AHIMA; 2013. ISBN 9781584265030.

Leon-Chisen N. ICD-10-CM and ICD-10-PCS Coding Handbook. Chicago, IL: American Hospital Association (AHA); 2016 revised ed. ISBN 9781556484117.

Lovaasen KR, Schwerdtfeger BS. ICD-10-CM/PCS Coding: Theory and Practice, 2016 ed. Abingdon, MD: Elsevier. ISBN 9780323389938.

APPENDIX B. ICD-10-PCS PROCEDURE CCS CATEGORIES THAT ARE NOT POPULATED BY ICD-10-PCS CODES

In mapping the Healthcare Cost and Utilization Project (HCUP) ICD-9-CM CCSs to ICD-10-PCS CCSs, we found that eight Clinical Classification Software (CCS) categories did not populate with ICD-10-PCS codes. This occurred because the ICD-10-PCS code set no longer uses diagnoses in the description of procedure codes. In ICD-10-PCS the diagnosis of the patient does not influence the code assignment. Below is a list of the eight CCS categories that were not populated with ICD-10-PCS codes. For each of these CCS categories, additional information is provided: (1) ICD-9-CM codes found in the CCS; (2) PCS codes that have been mapped to the ICD-9-CM code(s) in the CCS, via the General Equivalency Mappings (GEMs); (3) the rationale for why the PCS codes did not populate the CCS; and (4) the ICD-10-PCS CCS code assignment. This document can be used to help users of HCUP databases understand where CCS volumes have shifted for this set of PCS CCS categories.

Table B3. HCUP CCS Categories Not Populated With ICD-10-PCS Codes

CCS 57 – Creation; revision and removal of arteriovenous fistula or vessel-to-vessel cannula for dialysis		
ICD-9-CM codes	39.27 arteriovenostomy for renal dialysis 39.42 revision of arteriovenous shunt for renal dialysis 39.43 removal of arteriovenous shunt for renal dialysis 39.93 insertion of vessel-to-vessel cannula	
ICD-10-PCS codes connected to ICD-9-CM codes via the GEMs	031 (2-C)	Bypass of upper arteries (innominate, subclavian [R&L], axillary [R&L], brachial [R&L], ulnar [R&L], radial [R&L] arteries)
Rationale	Use of diagnosis combined with a procedure has been discontinued in ICD-10-PCS. The diagnosis of the patient no longer has bearing in the assignment of the procedure code. Therefore this CCS is not populated with ICD-10-CM codes because these procedure could be performed for reasons other than dialysis.	
ICD-10-PCS CCS assignment	031 (2-C)	CCS 55, Peripheral vascular bypass.
CCS 68 – Injection or ligation of esophageal varices		
ICD-9-CM codes	42.91 ligation of esophageal varices	
ICD-10-PCS codes connected to ICD-9-CM codes via the GEMs	06L3	Occlusion of esophageal vein
Rationale	Use of diagnosis combined with a procedure has been discontinued in ICD-10-PCS. The diagnosis of the patient no longer has bearing in the assignment of the procedure code. Therefore, this CCS is not populated with ICD-10-CM codes because these procedures could be performed for a diagnosis other than esophageal varices.	
ICD-10-PCS CCS assignment	06L3	CCS 61, Other OR procedures on vessels other than head and neck

CCS 140 – Repair of current obstetric laceration

ICD-9-CM codes	75.50 repair of current obstetric laceration of uterus, NOS 75.51 repair of current obstetric laceration of cervix 75.52 repair of current obstetric laceration of corpus uteri 75.61 repair of current obstetric laceration of bladder and urethra 75.62 repair of current obstetric laceration of rectum and sphincter ani 75.69 repair of other current obstetric laceration	
ICD-10-PCS codes connected to ICD-9-CM codes via the GEMs	0UQ9	Repair of uterus
	0UQC	Repair of cervix
	0UQG	Repair of vagina
	0TQB	Repair of bladder
	0TQD	Repair of bladder neck
	0DQP	Repair of rectum
	0DQR	Repair of anal sphincter
Rationale	Use of diagnosis combined with a procedure has been discontinued in ICD-10-PCS. The diagnosis of the patient no longer has bearing in the assignment of the procedure code. Therefore this CCS is not populated with ICD-10-CM codes because these procedure could be performed for reasons other than pregnancy/delivery.	
ICD-10-PCS CCS assignment	0UQ (9,C,G)	CCS 132, Other OR therapeutic procedure; female organs
	0TQB	CCS 112, Other OR therapeutic procedures of urinary tract
	0TQD	CCS 109, Procedures on the urethra
	0DQ (P,R)	CCS 96, Other OR lower GI therapeutic procedures

CCS 143 – Bunionectomy or repair of toe deformities

ICD-9-CM codes	77.51 bunionectomy with soft tissue correction and osteotomy of the first metatarsal 77.52 bunionectomy with soft tissue correction and arthrodesis 77.53 other bunionectomy with soft tissue currection 77.54 excision or correction of bunionette 77.56 repair of hammer toe 77.57 repair of claw toe 77.58 other excision, fusion, and repair of toes 77.59 other bunionectomy	
ICD-10-PCS codes connected to ICD-9-CM codes via the GEMs	0LQ (V&W)	Repair of foot tendon (R&L)
	0MQ (S&T)	Repair of foot bursae and ligament (L&R)
	0Q8 (N&P)	Division of metatarsal (L&R)
	0QB (N&P)	Excision of metatarsal (L&R)
	0QB (Q&R)	Excision of toe phalanx (L&R)
	0QQ (Q&R)	Repair of toe phalanx (L&R)

	0SG (M&N)	Fusion of metatarsal-tarsal joint (L&R)
	0SG (P&Q)	Fusion of toe phalangeal joint (R&L)
	0ST (P&Q)	Resection of toe phalangeal joint (R&L)
Rationale	Use of diagnosis combined with a procedure has been discontinued in ICD-10-PCS. The diagnosis of the patient no longer has bearing in the assignment of the procedure code. Therefore this CCS is not populated with ICD-10-CM codes because these procedure could be performed for reasons other than bunions or toe deformities.	
ICD-10-PCS CCS assignment	0LQ (V&W)	CCS 160, other therapeutic procedures on muscles and tendons
	0MQ (S&T)	CCS 164, other OR therapeutic procedures on musculoskeletal system
	0Q8 (N&P)	CCS 161, other OR therapeutic procedures on bones
	0QB (N&P)	*If therapeutic* CCS 142, partial excision of bone *If diagnostic* CCS 159, other diagnostic procedures on musculoskeletal system
	0QB (Q&R)	*If therapeutic* CCS 142, partial excision of bone *If diagnostic* CCS 159, other diagnostic procedures on musculoskeletal system
	0QQ (Q&R)	CCS 161, other OR therapeutic procedures on bones
	0SG (M&N)	CCS 162, other OR therapeutic procedures on joints
	0SG (P&Q)	CCS 162, other OR therapeutic procedures on joints
	0ST (P&Q)	CCS 162, other OR therapeutic procedures on joints

CCS 151 - Excision of semilunar cartilage of knee

ICD-9-CM codes	80.6 excision of semilunar cartilage of knee	
ICD-10-PCS codes connected to ICD-9-CM codes via the GEMs	0SB (C&D)	Excision of knee joint (R&L)
Rationale	Cartilage is not a specified body part in ICD-10-PCS; instead, cartilage is considered a component of the knee joint. Therefore, Excision of knee joint codes could represent partial removal of body parts other than cartilage.	
ICD-10-PCS CCS assignment	0SB (C&D)	*If therapeutic*, CCS 162, other OR therapeutic procedures on joints *If diagnostic*, CCS 159, other diagnostic procedures on musculoskeletal system

CCS 169 – Debridement of wound; infection or burn

ICD-9-CM codes	86.22 excisional debridement of wound, infection, or burn 86.28 nonexcisional debridement of wound, infection, or burn	
ICD-10-PCS codes connected to ICD-	0HB (0-N)	Excision of skin
	0JB	Excision of subcutaneous tissue and fascia

9-CM codes via the GEMs	0HD (0-Q)	Extraction of skin
	0JD	Extraction of subcutaneous tissue and fascia
Rationale	Use of diagnosis combined with a procedure has been discontinued in ICD-10-PCS. The diagnosis of the patient no longer has bearing in the assignment of the procedure code. Therefore this CCS is not populated with ICD-10-CM codes because these procedure could be performed for conditions other than wound, infection, or burn.	
ICD-10-PCS CCS assignment	0HB (0-N)	CCS 170, excision of skin CCS 173, other diagnostic procedures on skin, subcutaneous tissue, fascia and breast CCS 174, other non-OR therapeutic procedures on skin, subcutaneous tissue, fascia and breast CCS 175, other OR therapeutic procedures on skin, subcutaneous tissue, fascia and breast
	0JB	CCS 173, other diagnostic procedures on skin, subcutaneous tissue, fascia and breast CCS 174, other non-OR therapeutic procedures on skin, subcutaneous tissue, fascia and breast CCS 175, other OR therapeutic procedures on skin, subcutaneous tissue, fascia and breast
	0HD (0-Q)	CCS 174, other non-OR therapeutic procedures on skin, subcutaneous tissue, fascia and breast
	0JD	CCS 175, other OR therapeutic procedures on skin, subcutaneous tissue, fascia and breast
CCS 206 – *Microscopic examination (bacterial smear; culture; toxicology)*		
ICD-9-CM codes	90.01-90.99, Microscopic examination – I 91.01-91.99, Microscopic examination – II	
ICD-10-PCS codes connected to ICD-9-CM codes via the GEMs	No corresponding codes in ICD-10-PCS	
Rationale	Microscopic examination codes are not included in the ICD-10-PCS code set. Microscopic examination services should be reported via the chargemaster with revenue codes and associated charges for inpatient reimbursement submission. For data collection, CPT codes are often utilized in the chargemaster for these services.	
ICD-10-PCS CCS assignment	N/A	

Abbreviations: CCS, Clinical Classifications Software; CPT®, Current Procedural Terminology; GEMs, General Equivalency Mappings; HCUP, Healthcare Cost and Utilization Project; N/A, not applicable; OR, operating room

APPENDIX C. EXAMINING THE IMPACT OF ICD-10-CM/PCS IMPLEMENTATION

We utilized the Clinical Classifications Software (CCS) to examine the impact of transitioning from ICD-9-CM to ICD-10-CM and ICD-10-PCS.

CCS is a diagnosis and procedure categorization scheme that collapses all ICD-9-CM and ICD-10-CM/PCS codes into a smaller number of clinically meaningful diagnosis and procedure groups. The CCS for ICD-10-CM and PCS was developed by mapping ICD-10-CM/PCS codes to the original CCS categories developed for ICD-9-CM. These CCS condition and procedure groups provide a means to identify cohorts for disease- or procedure-specific studies and for reporting statistical information about hospitalizations and health care resource utilization.

Dually Coded Discharge Dataset

We analyzed a dually coded dataset provided by the Washington State Department of Health that contained diagnosis and procedure codes for 2,665 inpatient discharge records. Of the records, all contained ICD-9-CM and ICD-10-CM/PCS diagnosis codes and 1,456 records (55 percent) also contained procedure codes for both the ICD-9-CM and the ICD-10-CM/PCS coding systems.

We used the HCUP CCS for ICD-9-CM and HCUP CCS for ICD-10-CM/PCS tools to assign a CCS category to each diagnosis and procedure in the dataset, resulting in 26,024 individual diagnosis codes and 3,971 procedure codes. We reviewed CCS assignments from this dataset to identify how differences in the ICD-9-CM and ICD-10-CM/PCS coding systems affect the CCS assignments and, in turn, how these differences in CCS assignments could affect research endeavors.

To compare the rate of agreement in CCS assignment, with CCS diagnosis or procedure category as the unit of analysis, we sampled at the discharge level to allow a full review of the coding and mapping issues. Discharges were sampled to achieve a 95 percent confidence level with precision of error rate of +/–2.5 percent in the overall agreement rate (approximately 1,000 codes). The estimated error rates were adjusted to accommodate cluster sampling.

Review of Dually Coded Data

We identified two major causes of differences between the CCS assignment in the ICD-9-CM and ICD-10-CM/PCS codes. The first major difference was **coding inconsistencies**, the second was **differences in the coding systems**.

Our review of the dually coded database showed that most CCS assignments remain consistent through the ICD-10-CM/PCS implementation, as shown in Table C1. First, we determined coding inconsistency—a diagnosis or procedure was coded in one system but not in the other. This occurred at a rate of 9.3 percent for diagnoses and 12.5 percent for procedures. When these coding inconsistencies were omitted from the denominator, 94.7 percent of CCS diagnosis code assignments and 88.7 percent of CCS procedure code assignments were consistent across both coding systems. These results show that CCS assignments for most conditions and procedures do not change.

Table C1. Comparison of CCS Code Assignment in ICD-9-CM and ICD-10-CM/PCS

Diagnosis Code			
Category	**Frequency**	**Overall Percentage**	**% With Coding Agreement**
Coding inconsistency (a diagnosis or procedure was coded in one system but not in the other)	94	9.3	
CCS assignment consistent between ICD-9-CM and ICD-10-CM/PCS	870	85.9	94.7
Differences in coding systems (different CCS coded)	49	4.8	5.3
Total	1,013	100	100
Procedure Code			
Category	**Frequency**	**Overall Percentage**	**% With Coding Agreement**
Coding inconsistency (a diagnosis or procedure was coded in one system but not in the other)	145	12.5	
CCS assignment consistent between ICD-9-CM and ICD-10-CM/PCS	903	77.6	88.7
Differences in coding systems (different CCS coded)	115	9.9	11.3
Total	1,163	100	100

Abbreviation: CCS, Clinical Classifications Software

Disagreement in CCS assignment between ICD-9-CM and ICD-10-CM/PCS codes was 5.3 percent for diagnosis codes and 11.3 percent for procedure codes. The lower percentage of disagreement for the diagnosis codes was expected because the ICD-10-CM diagnosis codes are a revision of the prior coding system. However, the ICD-10-PCS procedure codes reflect a complete change in the structure of the procedure coding system.

In the sections below, we outline the primary causes of these differences in the two coding systems—**increased or decreased specificity**, **changes in the coding rules**, and **reclassification of codes**. We provide examples from the dually coded dataset to illustrate the impact that these differences between the coding systems have on the CCS assignments for ICD-10-CM/PCS. We also discuss additional issues that can affect the use of these data in research—coding errors and two types of **coding inconsistencies** that cause the CCS assignment to be different. It should be noted that not all of the differences are negative; some are positive, and some are neutral.

Changes in Level of Specificity

Increased Specificity in the ICD-10-CM/PCS Coding System

One of the main features of the ICD-10-CM/PCS coding system is increased specificity resulting from greater clinical detail. Coders use physician documentation within the medical record to make coding assignments—the greater detail in ICD-10-CM/PCS allows coders to take advantage of the clinical information in the physician notes. Although we did not have access to medical records, our review of the dually coded dataset identified examples in which physician documentation supported the selection of a more specific code in ICD-10-CM/PCS than was possible in ICD-9-CM.

Example 1. Increased Specificity in ICD-10-PCS Procedure Codes and CCS Assignment—Clipping of Aneurysm

ICD-9-CM	ICD-10-PCS
39.51 Clipping of aneurysm	Can isolate restriction procedures by artery, approach, and device (Characters 1–3) 03V - Upper artery restriction (Characters X–X) Type of approach (open, percutaneous, percutaneous endoscopic) (Characters X–X) Type of device (extra luminal, intraluminal bioactive, intraluminal)
Assigned CCS 61, Other OR procedures on vessels other than head and neck	CCS assignment has greater specificity: Example code: 03VG0CZ, Restriction of intracranial artery, extraluminal device, open approach Assigned CCS 59, Other OR procedures on vessels of head and neck

As shown in Example 1, in ICD-9-CM, there is one code for Clipping of aneurysm, 39.51. In ICD-10-PCS, the expanded, seven-character code for this restriction procedure, defined as partially closing an orifice or the lumen of a tubular body part, includes additional information about which artery is restricted, the type of approach, and the device used.[1]

The example provided in the table, 03VG0CZ, reflects a restriction of the intracranial artery involving an open approach and using an extraluminal device. This level of specificity in artery, approach, and device, which has been and continues to be documented by the physician in the operative report, will improve future research that examines these procedures using ICD-10-PCS data.

| ICD-10-CM/PCS allows for greater clinical specificity in many cases. | This example of the increased specificity of ICD-10-PCS codes also illustrates how the additional information affects CCS assignment for this procedure. |
| Increased specificity could result in changes in CCS assignments. | Two CCS codes represent "other procedures on vessels": CCS 59 for vessels other than head and neck and CCS 61 for vessels of the head and neck. The ICD-9-CM 39.51 code for "Clipping of aneurysm" does |

not provide anatomical information, so it is assigned to CCS 61, Other OR procedures on vessels other than head and neck, which represents the majority of these procedures. The additional information in the ICD-10-PCS codes—in this case, the ability to distinguish between cranial and noncranial procedures—permits a higher level of accuracy in the CCS classification.

Example 2. Greater Specificity in ICD-10-CM Diagnosis Codes and CCS Assignment— Group B Streptococcus Carrier

ICD-9-CM	ICD-10-CM
V02.51, Group B Streptococcus carrier	O99.820, Streptococcus B carrier state complicating pregnancy
Assigned CCS 10, Immunizations and screening for infectious disease	Assigned to CCS 181, Other complications of pregnancy

The new coding system also contains increased specificity for diagnosis codes. For example, the dually coded dataset included an encounter, illustrated in Example 2, involving a pregnant woman who is a Group B streptococcus carrier. The ICD-9-CM code for a Group B streptococcus carrier is V02.51. The ICD-10-CM code includes additional information about the carrier—an encounter for a pregnant woman with this status is coded as O99.820, Streptococcus B carrier state complicating pregnancy. For all other people (i.e., males and nonpregnant females), the ICD-10-CM code is Z22.330, Carrier of Group B streptococcus. This added specificity will allow researchers to identify pregnant women who are carriers of Group B streptococcus with a single code, O99.820; previously, this identification required the use of conditional logic that identified a pregnancy code as well as a Group B streptococcus code on the same claim.

The specific code for Group B streptococcus carriers also allows a pregnancy-specific CCS to be assigned for the ICD-10-CM diagnosis code. The ICD-10-CM code O99.820, which links the Group B streptococcus carrier condition to pregnancy, is assigned to CCS 181, Other complications of pregnancy. The ICD-9-CM code V02.51 and the ICD-10-CM code Z22.330 are assigned to CCS 10, Immunizations and screening for infectious disease. Researchers seeking to include or exclude pregnant women from their studies via Group B streptococcus carrier status should closely review codes/CCS assignment used in their sampling methodology.

More ICD-10-CM/PCS Codes Than ICD-9-CM Codes May be Required

There are instances in which more ICD-10-CM codes are required for reporting conditions and procedures, as shown in Example 3. Reporting skull fractures with hemorrhage and loss of consciousness requires two codes in ICD-10-CM, whereas only one code was required in ICD-9-CM. In the dually coded dataset, an encounter for fracture of the base of skull with subdural

hemorrhage without loss of consciousness was reported with the ICD-9-CM code 801.21. This encounter required two ICD-10-CM codes: S02.19XA and S06.5X0A. Therefore, conditional logic is required to find patients with fracture with loss of consciousness using ICD-10-CM data. However, it is important to note that ICD-10-CM provides separate codes for a traumatic subdural hemorrhage (subcategory S06.5) versus a traumatic subarachnoid hemorrhage (subcategory S06.6). This increased level of detail that specifies the type of hemorrhage could enhance outcome studies involving patients with skull fractures.

Example 3. More Diagnosis Codes Required in ICD-10-CM—Intracranial Injuries and Skull Fractures

ICD-9-CM	ICD-10-CM
One code:	In ICD-10-CM two codes are required:
801.21, Fracture of base of skull, closed, with subarachnoid, subdural, and extradural hemorrhage, with no loss of consciousness	S02.19XA, Other fracture of base of skull, initial encounter for closed fracture, AND S06.5X0A, Traumatic subdural hemorrhage without loss of consciousness, initial encounter
CCS 233, Intracranial injury	CCS 233, Intracranial injury, AND CCS 228, Skull and face fracture

Example 3 illustrates how the total CCS volume can be affected by the implementation of the new code set. In ICD-9-CM, one CCS 233, Intracranial injury, is reported for this encounter. In ICD-10-CM, in addition to CCS 233 for the intracranial injury (S06.5X0A), CCS 228, Skull and face fracture, is reported for the skull fracture (S02.19XA). The CCS codes reported for ICD-10-CM paint a more accurate picture of what occurred during the encounter—the patient experienced both an intracranial injury and a skull fracture. Research could benefit from additional information that allows intracranial injuries with and without fractures to be examined separately. Additionally, one would expect the volume for CCS 233 to increase in fiscal year 2016 as a result.

> ICD-10-CM/PCS requires more diagnosis or procedure codes than ICD-9-CM in certain cases.
>
> Additional clinical specificity is often the result.
>
> Because of the increase in codes, CCS assignments and CCS volumes could shift.

The dually coded dataset included an encounter for total abdominal hysterectomy (Example 4). This example illustrates bullet A of the Multiple Procedure guideline (see text box): coding multiple procedures when "the same root operation is performed on different body parts as defined by distinct values of the body part character." In ICD-9-CM, a total abdominal

hysterectomy is reported using the code 68.49. In ICD-10-CM/PCS, two codes are required because both the uterus and the cervix are removed during this procedure and each has its own specific body part value. Therefore, codes 0UT90ZZ, and 0UTC0ZZ are required to report a hysterectomy in ICD-10-CM/PCS. It is also important to note that if fallopian tubes and/or ovaries are removed during the procedure, the procedures are reported using separate codes in both ICD-9-CM and ICD-10-CM/PCS.

The CCS reporting also is affected in this example. In ICD-9-CM, code 68.49 is assigned to CCS 124. In ICD-10-CM/PCS, code 0UT90ZZ is assigned to CCS 124 and code 0UTC0ZZ is assigned to CCS 125. Therefore, one would expect to see an increase in volume in fiscal year 2016 for CCS 125, because this code was not previously reported for hysterectomies.

Guidelines for Multiple Procedures

The Official Coding Guidelines for the Medical and Surgical Section of ICD-10-PCS instruct coders to report multiple procedure during the same operative episode if certain conditions are met. "Multiple procedures are coded if:

A. The same root operation is performed on different body parts as defined by distinct values of the body part character.
B. The same root operation is repeated in multiple body parts, and those body parts are separate and distinct body parts classified to a single ICD-10-PCS body part value.
C. Multiple root operations with distinct objectives are performed on the same body part.
D. The intended root operation is attempted using one approach, but is converted to a different approach."[2]

(Official Coding Guidelines for ICD-10-PCS, guideline B3.2)

Example 4. More Procedure Codes Required in ICD-10-PCS—Hysterectomy

ICD-9-CM	ICD-10-PCS
One code:	In ICD-10-PCS two codes are required:
68.49, Other and unspecified total abdominal hysterectomy	0UT90ZZ, Resection of uterus, open approach, AND 0UTC0ZZ, Resection of cervix
CCS 124, Hysterectomy; abdominal and vagina	CCS 124, Hysterectomy; abdominal and vagina, AND CCS 125, Other excision of cervix and uterus

Increased Number of Combination Codes in ICD-10-CM/PCS Resulting in Fewer Codes

Because of the increase in combination codes in ICD-10-CM/PCS, there are instances in which fewer ICD-10-CM/PCS codes capture the same information that required multiple codes in ICD-9-CM. As shown in Example 5, alcohol dependence with withdrawal requires two codes in ICD-9-CM: 291.81, and 303.91. In ICD-10-CM/PCS, the use of combination codes for alcohol and drug use, abuse, and dependence has increased dramatically. There are three options for reporting alcohol dependence with withdrawal in ICD-10-CM/PCS: F10.230, F10.231, and F10.239. Combination coding can benefit research studies that strive to examine a condition with a specific complication or manifestation. Combining the condition and the complication or manifestation into one code eliminates the need for conditional logic to identify the patient population being investigated.

Example 5. Increase in Availability of Combination Diagnosis Codes in ICD-10-CM—Alcohol Dependence With Withdrawal

ICD-9-CM	ICD-10-CM
Alcohol dependence with withdrawal (2 codes required): 291.81, Alcohol withdrawal, AND 303.91, Other and unspecified alcohol dependence, continuous	Three single codes available: F10.230, Alcohol dependence with withdrawal uncomplicated, OR F10.231, Alcohol dependence with withdrawal with perceptual disturbance, OR F10.239, Alcohol dependence with withdrawal, unspecified
CCS 660, Alcohol-related disorders, reported twice in ICD-9-CM	CCS 660, Alcohol-related disorders, reported once in ICD-10-CM

ICD-10-CM/PCS includes many new combination codes, which results in fewer codes (e.g., one code instead of two).

Because of the increase in combination coding, CCS assignments and CCS volumes could shift.

The use of combination codes also affects the volume of CCS reported for the encounter. In this example, CCS 660, Alcohol-related disorders, was reported twice in ICD-9—once for code 291.81 and once for code 303.91. In ICD-10-CM/PCS, CCS 660 is reported only once because the combination code for alcohol dependence with withdrawal (F10.239) is used. As a result of the increase in combination coding for ICD-10-CM/PCS, CCS assignments and CCS volumes could shift in fiscal year 2016.

Example 6. Seven-digit ICD-10-PCS Codes Can Reduce the Number of Procedure Codes Required—Percutaneous Transluminal Coronary Angioplasty

ICD-9-CM	ICD-10-PCS
Percutaneous transluminal coronary angioplasty (PTCA requires more than one code.) 00.66, Percutaneous transluminal coronary angioplasty, AND use 00.40-00.43 to Identify the number of vessels treated	In ICD-10-PCS a secondary procedure code is no longer required to identify the number of vessels (imbedded in fourth character of the code). PTCA codes begin with 027, Dilation of heart and great vessels. Fourth Character: body part (i.e., coronary artery one site, coronary artery two sites, coronary artery three sites, and coronary artery four or more sites)
CCS 45, Percutaneous transluminal coronary angioplasty (PTCA),	CCS 45, Percutaneous transluminal coronary angioplasty (PTCA)

ICD-9-CM	ICD-10-PCS
AND CCS 61, Other OR procedures on vessels other than head or neck	

Because of the increased number of characters in the ICD-10-CM/PCS coding system, a single seven-character code can often be used to report a procedure that required multiple codes in ICD-9-CM, Volume 3. For example, percutaneous transluminal coronary angioplasty (PTCA) procedures require multiple ICD-9-CM codes (Example 6). First, PTCA is reported using code 00.66. Next, according to the *code also* notes included in the code book, a code that identifies the number of vessels treated should be reported using a code from 00.40-00.43. In ICD-10-CM/PCS, information about the number and type of vessels are included in one code. ICD-10-CM/PCS PTCA dilation procedure codes begin with 027 and the fourth character identifies the body part. Because of this body part specificity, a secondary procedure code no longer is required to identify the number of vessels.

The new ICD-10-CM/PCS code structure also influences the CCS to be assigned for PTCA cases. ICD-9-CM requires two CCS assignment: the code 00.66 is assigned to CCS 45 and the codes in the 00.40-00.43 range are assigned to CCS 61. Because only one code is required to report the procedure in ICD-10-CM/PCS, only one CCS is reported. In our dually coded dataset, the single code 027034Z was assigned. This code is assigned to CCS 45. Individuals examining the volume of CCS 61 in fiscal year 2016 to study PTCA should expect to see a decrease in volume as a result of coding changes such as the one described in this example.

Changes in Coding Rules

Rehabilitation Cases

Coding for inpatient rehabilitation encounters has been modified with ICD-10-CM/PS. The ICD-9-CM coding guideline 1.B.15 indicates that admissions for rehabilitation required a code from category V57, as the principal/first-listed diagnosis code.[3] However, the code category for Care involving use of rehabilitation procedure was removed from the ICD-10 code set. All ICD-9-CM V57 codes map to the ICD-10-CM/PCS code Z51.89. Further, coding guideline 1.B.15 (ICD-9) was removed from the ICD-10-CM/PCS Official Coding Guidelines. With the removal, the assignment of the principal diagnosis for inpatient rehabilitation encounters should follow the same guidelines as other inpatient admissions. Specifically, the principal diagnosis for rehabilitation encounters should follow the guidelines presented in Section II of the Coding Guidelines, Selection of Principal Diagnosis. "The principal diagnosis is defined in the Uniform Hospital Discharge Data Set (UHDDS) as that condition established after study to be chiefly responsible for occasioning the admission of the patient to the hospital for care".[4] Therefore, the condition for which the patient is being admitted for rehabilitative treatment, be it a definitive diagnosis or sign/symptom, should be assigned as the principal diagnosis.

ICD-9-CM V57 codes are assigned to CCS 254. In ICD-10-CM/PCS the CCS for the principal diagnosis for rehabilitation encounters will vary because the definitive diagnosis will vary by patient encounter. In our dually coded dataset there were a variety of principal diagnoses reported for rehabilitation encounters such as aspiration pneumonitis (CCS 129, Aspiration pneumonitis; food/vomitus) and thrombocytopenia (CCS 62, Coagulation and hemorrhagic disorders). So a consistent CCS like CCS 254 will not be reported for inpatient rehabilitation encounters. Not only will the volume for CCS 254 drastically decrease for fiscal year 2016, but researchers who have utilized CCS 254 to identify inpatient rehabilitation encounter cohorts no longer will be able to do so.

> ICD-9-CM coding guideline 1.B.15, required admissions for rehabilitation use the V57 category as the principal/first listed code.
>
> This guideline has been removed in ICD-10-CM and all V57 codes map to Z51.89, Encounter for other specified aftercare.
>
> The condition or symptom for which admission is made will be listed as the principal/first listed code.
>
> Volume of CCS 254, Rehabilitation care, fitting of prostheses; and adjustment of devices will decline dramatically, coincident with increases in CCS assignment for the principal/first listed code.

Tobacco Use Diagnosis Codes: Large Structural Changes

In the dually coded dataset there were several encounters that included the condition of tobacco use. The coding options for tobacco use have expanded from one code in ICD-9-CM to 20 codes in ICD-10-CM/PCS. In ICD-9-CM, tobacco use is reported with code 305.1, Tobacco use disorder. According to the ICD-9-CM Index, coders use this code for tobacco dependence and tobacco abuse.[5] The alcohol and drug use, abuse and dependence sections were revised in ICD-10-CM. Some of the codes contain greater specificity, and the section was restructured to improve code consistency. Additionally, the term "tobacco" was replaced with "nicotine." In ICD-10-CM code F17.200 is used to report nicotine dependence. Specific nicotine codes are also available for use. Codes are also available if the patient is in remission or experiencing withdrawal or other types of nicotine-induced disorders for each type of nicotine product.

> A single code, 305.1, Tobacco use disorder was available in ICD-9-CM.
>
> Over 20 codes are available in ICD-10-CM (largely replacing *tobacco* with *nicotine*) with greater specificity.
>
> A single code in ICD-10-CM, Z72.0, Tobacco use, may create confusion for coders and is not intended to replace 305.1. It is intended to be used sparingly and is not a definitive diagnosis.
>
> Use caution when coding and interpreting nicotine/tobacco codes.

The change in terminology, as well as Index entries, has caused some confusion for coders in reporting the correct diagnosis when phrases such as "smoker," "patient smokes 1 pack per day," or "uses chewing tobacco" are recorded in the medical record. The ICD-10-CM Index contains an entry for nicotine dependence (*Dependence, drug, nicotine*) and an entry for tobacco.[4] The tobacco entry cross-references to dependence, nicotine and also provides entries for harmful use, which leads the coder to code Z72.0, Tobacco use. This Index entry is confusing to coders because the ICD-10-CM terminology for code

Z72.0 matches the ICD-9-CM terminology for code 305.1. However, the two codes are not meant to be equal. Code Z72.0 is in Chapter 21, Factors Influencing Health Status and Contact With Health Services, and is in category Z72, Problems related to lifestyle. It is not intended to be a definitive diagnosis code.

Because this area is confusing for coders, the proper coding is clarified in Coding Clinic (a publication of the the American Heart Association [AHA] and the result of work performed by the cooperating parties, AHA, AHIMA, the Centers for Medicare & Medicaid Services [CMS], and the National Center for Health Statistics [NCHS]). The Coding Clinic offers the only official advice for ICD coding in the United States. In the fourth quarter, 2013 Coding Clinic on page 108 advises coders to utilize code F17.200 when the physician documents "smoker" in the medical record. It instructs the coders to not use code Z72.0. In our dually coded dataset we identified several instances where code 305.1 was reported in ICD-9-CM and code Z72.0 was reported in ICD-10-CM/PCS. In these instances, the coding advice as published in the Coding Clinic was not followed. As coders become more experienced with the new coding system and familiar with all of the rules and advice coding accuracy will become more accurate. However, at the beginning of the implementation researchers should be aware that there will be some instances of coding inaccuracy.

Reclassification of Codes

Large Structural Changes in Procedure Coding: Diagnosis Not Included in ICD-10-PCS

One of the key features of ICD-10-PCS is that diagnostic information is not contained in the procedure description,[2] whereas several ICD-9-CM procedure code definitions contain information about the diagnosis. For example, the use of code ICD-9-CM code 86.22 is limited to the specific conditions listed in the code description (Example 7).

> Researchers may have relied on ICD-9-CM procedure codes containing diagnostic information to specify a patient cohort.
>
> With the implementation of ICD-10-PCS, diagnosis is not included in procedure codes.
>
> Researchers may need to combine ICD-10-CM diagnosis code information with ICD-10-PCS procedure codes to find patient cohorts.

ICD-10-PCS does not limit procedures to certain conditions; instead, the reason the procedure is performed is communicated through the diagnosis code reported for the encounter.[2] In ICD-10-PCS, debridement is considered an excision, which is the cutting out or off, without replacement, of a portion of a body part.[1] Applicable ICD-10-PCS codes for the ICD-9-CM code 86.22 can be found in PCS tables 0HB, Excision of Skin and Breast, and 0JB, Excision of subcutaneous tissue and fascia.

As a result, CCS 169, Debridement of wound, infection, or burn, will not be populated with fiscal year 2016 data. Instead, CCS for debridement will include such codes as CCS 170, Excision of skin; CCS 174, Other non-OR therapeutic procedures on skin, subcutaneous tissue, fascia and breast; and CCS 175, Other OR therapeutic procedures on skin, subcutaneous tissue, fascia and breast.

Example 7. Diagnosis Not Included in ICD-10-PCS—Debridement

ICD-9-CM	ICD-10-PCS
86.22, Excisional debridement of wound, infection, or burn	In ICD-10-PCS procedures are not limited by diagnosis (e.g., wound, infection, burn). Applicable codes include PCS tables: 0HB, Excision of Skin and Breast, and OJB, Excision of subcutaneous tissue and fascia
CCS 169, Debridement of wound; infection or burn	CCS 169 will not be populated in ICD-10-PCS. CCS such as CCS 170, Excision of skin; CCS 174, Other non-OR therapeutic procedures on skin, subcutaneous tissue, fascia and breast; and CCS 175, Other OR therapeutic procedures on skin, subcutaneous tissue, fascia and breast, will be reported for debridement procedures.

Another example is the Repair of current obstetric laceration codes (75.50-75.69), which are included in Chapter 13, Obstetrical Procedures of ICD-9-CM (Example 8).[4] These repair codes are utilized only when a laceration that was experienced during the birthing process is repaired. Because ICD-10-PCS does not include diagnostic information, the repair of a laceration resulting from the birthing process code choices are not located in the Obstetrics Section (codes that begin with the first character of 1). Instead, the coder needs to use a repair code from the Medical and Surgical section of the code set (codes that begin with the first character of 0). The ICD-10-PCS codes that correspond with the ICD-9-CM code range of 75.50-75.69 can be found in tables 0DQ, Repair of gastrointestinal system; 0TQ, Repair of the urinary system; 0UQ, Repair of the female reproductive system; and 0WQ, Repair of anatomical regions.[1]

> Due to structural changes in procedure coding, several CCS codes will not be populated in ICD-10-CM.

In ICD-9-CM, CCS 140 is reported for these procedures. With the implementation of ICD-10-PCS, CCS 140 will not be populated in fiscal year 2016. Instead, CCS laceration repair procedures will be reported using such codes as CCS 96 and CCS 132.

Example 8. Diagnosis Not Included in ICD-10-PCS—Repair of Current Obstetric Laceration

ICD-9-CM	ICD-10-PCS
75.50-75.69 Repair of current obstetrical laceration	In ICD-10-PCS these codes are not in the Obstetrics Section, and a code should be selected from the Medical and Surgical section PCS Tables: 0DQ, Repair of gastrointestinal system 0TQ, Repair of the urinary system 0UQ, Repair of the female reproductive system 0WQ, Repair of anatomical regions

ICD-9-CM	ICD-10-PCS
CCS 140, Repair of current obstetric laceration	CCS 140 will not be populated in ICD-10-PCS CCS such as CCS 96, Other lower GI therapeutic procedures, and CCS 132, Other OR therapeutic procedures; female organs, will be reported for these repair procedures.

In the past, researchers may have relied on ICD-9-CM procedure codes that contain diagnostic information to determine which encounters should be included in their research populations. With the implementation of ICD-10-CM/PCS, researchers will need to combine diagnosis codes with procedure codes to find patient cohorts. This is important to understand, because a mapping tool that converts from ICD-9-CM to ICD-10-CM/PCS will most likely not alert the researcher to the fact that the ICD-10-CM/PCS procedure codes are utilized for more conditions than the corresponding ICD-9-CM codes under review.

Reclassification of Diagnoses and Procedures

During the update from ICD-9-CM to ICD-10-CM/PCS, some conditions were reclassified to a different category or a different chapter within the code set. For example, in ICD-9-CM, sarcoidosis is reported with CCS code 135 and is included in Chapter 1's section on Other Infectious and Parasitic Diseases (Example 9). In ICD-10-CM/PCS, sarcoidosis was reclassified to Chapter 3, Diseases of the Blood and Blood-Forming Organs, and was expanded with several subcategories and subclassifications. This reclassification to Chapter 3's section on Certain Disorders Involving the Immune Mechanism represents a more accurate placement of the condition. Because sarcoidosis was reclassified, the CCS assignment has also changed.

> Reclassification of diagnoses and procedures in ICD-10-CM/PCS between categories or chapters will result in changes to CCS assignments CCS volumes could shift.

Example 9. Reclassification of Diagnosis and Procedure Codes—Sarcoidosis

ICD-9-CM	ICD-10-CM
135 Sarcoidosis Classified in Chapter 1, Other Infectious and Parasitic Diseases	Category D86, Sarcoidosis (with many subcategories and subclassifications) Classified in Chapter 3, Diseases of the Blood and Blood-Forming Organs
CCS 8, Other infections including parasitic	CCS 57, Immunity disorders

The body part chapters for ICD-10-CM/PCS procedure codes are constructed differently than they were in ICD-9-CM, Volume 3. As shown in Example 10, procedures performed on the head and neck bones have been moved from Chapter 1, Operations on the Nervous System, to the Medical and Surgical section of Head and Facial Bones (first two code characters 0N). Again, the CCS assignment will change in ICD-10-CM/PCS. One example in our dually coded dataset involved code 01.25 which is assigned to CCS 1. In ICD-10-CM/PCS it is code

0NT80ZZ which is assigned to CCS 161. CCS volumes are expected to change for the nervous system and musculoskeletal system because of this reclassification in ICD-10-CM/PCS.

Example 10. Reclassification of Diagnosis and Procedure Codes—Craniectomy

ICD-9-CM	ICD-10-PCS
01.25, Other craniectomy Classified in Chapter 1, Operations on the Nervous System	0NT80ZZ, Resection of left occipital bone, open approach Classified in Medical and Surgical section of Head and Facial Bones (first two code characters 0N)
CCS 1, Incision and excision of CNS	CCS 161, Other OR therapeutic procedure on bone

Less Specific Procedure Coding in ICD-10-PCS

When comparing the two coding systems, we identified some ICD-10-CM/PCS codes that were less specific than the ICD-9-CM codes, resulting in a loss of information. An example involves intraoperative cholangiography, which is reported with code 87.53. In ICD-1 cholangiography is reported with codes in table BF1, Fluoroscopy of the Hepatobiliary System and Pancreas. The character values in table BF1 do not include an option for "intra-operative." Therefore, the information is lost as to whether the fluoroscopy service was performed during the operative session or separate from the session. One would have to review the medical record documentation to abstract this information.

> In a few instances, ICD-10-PCS provides less information than ICD-9-CM.

Example 11. Less Specific Procedure Coding—Control of Postprocedural Gastrointestinal Bleeding

ICD-9-CM	ICD-10-PCS
44.43, Endoscopic control of gastric or duodenal bleeding was reported	0W3P8ZZ, Control bleeding in gastrointestinal tract, via natural or artificial opening endoscopic
CCS 93, Other non-OR upper GI therapeutic procedures	CCS 98, Other non-OR gastrointestinal procedures Note: Upper/lower GI distinction not made

Another example from the dually coded dataset of less specific information involves control of post-procedural gastrointestinal bleeding (Example 11). ICD-9-CM code 44.43 corresponds with ICD-10-CM/PCS code 0W3P8ZZ. In ICD-9-CM, codes are available for control of bleeding for the esophagus, gastric/duodenal, colon, and anus. This specificity is not available in ICD-10-CM/PCS, because the specific areas of the gastrointestinal tract are grouped into one body-part value for the root operation of control. Therefore, the only option available for coders is the gastrointestinal tract, with a fourth character value of P. This ICD-10-CM/PCS structure also results in a CCS change and also results in a loss of specificity about the "upper GI" and the "lower GI."

Coding Inconsistencies Between ICD-9-CM and ICD-10-CM/PCS

Coding inconsistencies occur when a condition is reported in one coding system and a related but not identical condition is reported in the other coding system for a given encounter. For example, in our review of the dually coded dataset, we found that one type of diabetes was reported in ICD-9-CM and another type of diabetes was reported in ICD-10-CM/PCS. Another type of coding inconsistency occurs when a condition, such as diverticulitis, is reported in one coding system—either ICD-9-CM or ICD-10-CM/PCS—but not the other for a given encounter. We could not identify which codes were accurate in these inconsistencies, because we did not have access to the medical record documentation that would be needed to make such a determination.

Our example of the inconsistency involving similar but not equal codes involves a single encounter that had the ICD-9-CM code 250.00, Diabetes mellitus without mention of complication, type II or unspecified, not stated as uncontrolled, and the ICD-10-CM/PCS code E11.8, Type 2 diabetes mellitus with unspecified complications. But without medical record documentation, the correct code cannot be verified.

There were also instances of coding inconsistencies for procedure reporting. For example, a single encounter had the ICD-9-CM code 03.09, Other exploration and decompression of spinal canal, and the ICD-10-CM/PCS code 0QB00ZZ, Excision of lumbar vertebrae, open approach. First, it is not clear whether a vertebral disc was removed or not. Second, if a disc were

> Coding inconsistencies between code systems and coders, such as dual coding ICD-9-CM and ICD-10-CM/PCS, should be expected.
>
> Diagnoses and procedures coded in one coding system may not appear in the other system.
>
> Slight variations in coding (e.g., type of diabetes) may also occur.
>
> Coding inconsistencies could affect CCS assignment.

excised during a spinal procedure, neither of the two codes is correct. Again, medical record documentation for this encounter is required to identify what type of procedure was performed and at what level.

These examples illustrate an important concept involving the presence of some inconsistency in coding at the beginning of the ICD-10-CM/PCS implementation, although any dually coded data may contain inconsistencies. Regardless of the cause, coders will become more efficient and accurate at coding in the new coding system as hospitals and facilities move through the implementation of ICD-10-CM/PCS.[6]

Examining the lessons learned from the dually coded dataset in this report provides an understanding of how differences in the new code sets affect administrative data and classification into larger groups such as CCS. When researchers select cohorts for studies that include data from both coding systems, they will need to pay close attention to how ICD-9-CM codes may be modified in ICD-10-CM/PCS.

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